TECHNOLOGY DEPARTMENT

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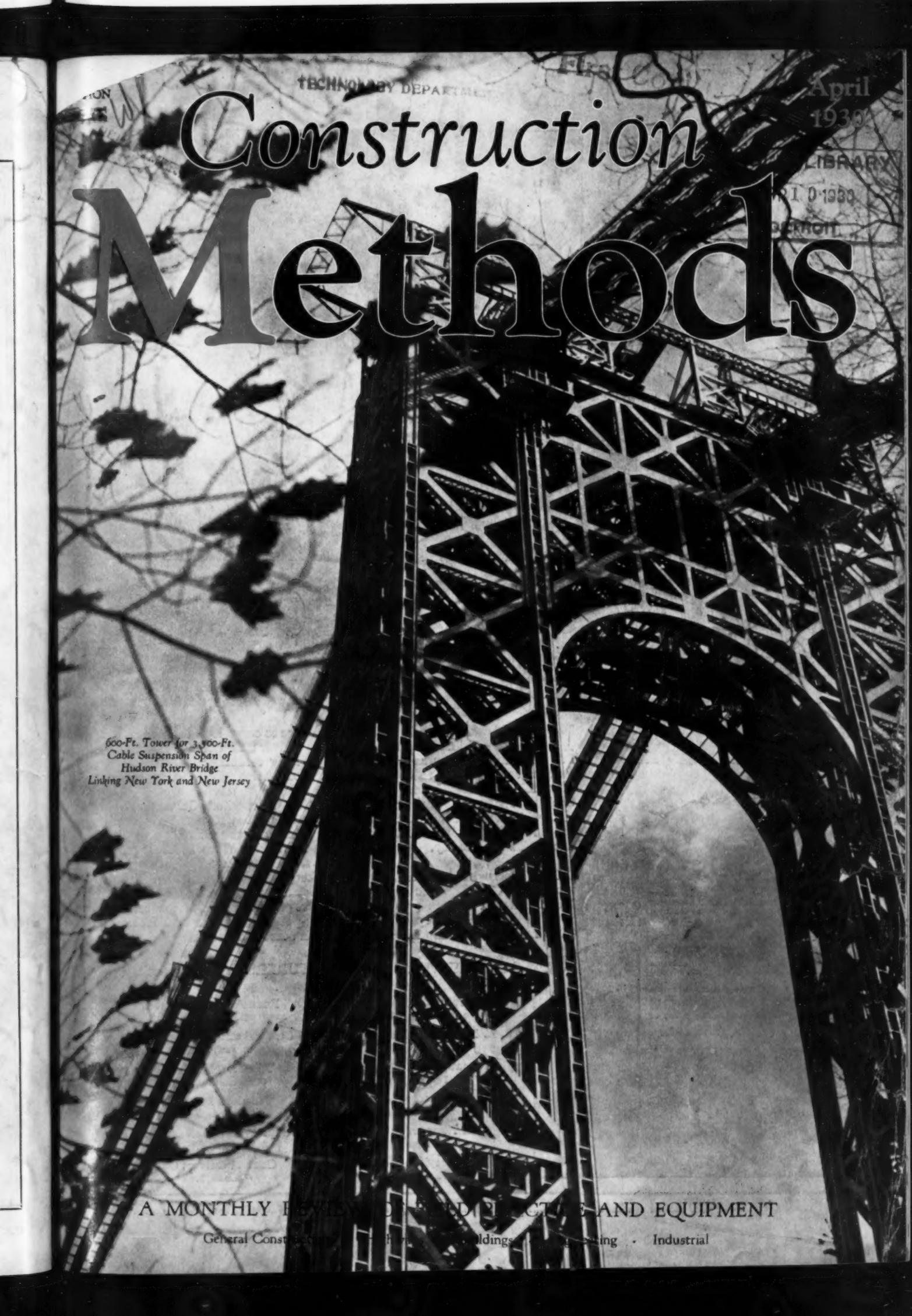
Construction Methods



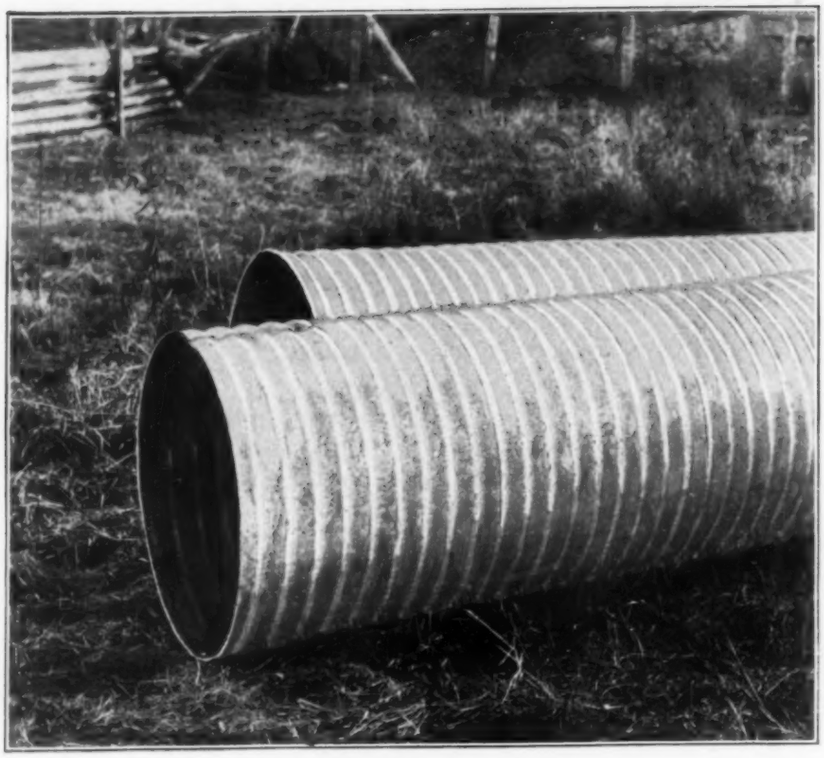
600-Ft. Tower for 3,500-Ft. Cable Suspension Span of Hudson River Bridge Linking New York and New Jersey

A MONTHLY REVIEW OF CONSTRUCTION AND EQUIPMENT

General Construction · Highways · Buildings · Engineering · Industrial

In ground 20 years — still "almost perfect."

Section of GOHI Corrugated Culvert installed in Putnam County, Tenn., in 1909.



How Long Will . . .

Corrugated Culverts Last? . . . *Nobody Knows!*

(Meet copper-bearing pure iron requirements in all accepted specifications for corrugated metal culverts.)

NO one knows now and probably no one will know for another fifty, seventy-five, or more years. But the service given in thousands of installations like the above points conclusively to a life far beyond the time when erosion and other natural forces will make re-location of the drains a necessity.

GOHI Corrugated Culverts are made of GOHI Genuine Open Hearth Iron which is guaranteed 99.90% pure Iron-Copper alloy. This material has the highest resistance to corrosion of any present-day culvert metal. Its durability is a fully established and demonstrated fact.

GOHI Corrugated Culverts have the strength to withstand any traffic conditions — the flexibility to prevent cracking from settling earth or freezing water. No repairs, no upkeep. Easily installed between sunup and sundown. Specify "GOHI Corrugated Culverts" for lowest-cost-per-year service and freedom from culvert troubles.

Here's Durability Proof

"In 1909, 1910, and 1911, as Secretary and Purchasing Agent for the General Road Commission of Putnam County, Tenn., I bought our culverts from the Newport Culvert Company. At that time they were known as Genuine Open Hearth Iron Culverts. I have today (October 18, 1929) in company with others, examined some of these culverts and found them almost perfect.

"A section of one of the culverts was removed in my presence, and upon inspection was found seemingly with no deterioration after twenty years of use."

(Signed) JAS. N. COX

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GOHI CULVERT MANUFACTURERS, Inc., Newport, Ky.

Denver Steel & Iron Works Co.
Denver, Colo.

A. N. Eaton, Metal Products
Omaha, Nebr.

Feenaughty Machinery Co.
Portland, Oregon

Lincoln Steel and Forge Co.
St. Louis, Mo.

The Newport Culvert Co.
Newport, Ky.

The Pennsylvania Culvert Co.
Philadelphia, Pa.

Roanoke Sales Corp.
Roanoke, Va.

St. Paul Corrugating Co.
St. Paul, Minn.

Tennison Brothers
Oklahoma City, Okla.

Tennison Brothers
Texarkana, Ark.

Capital City Culvert Co.
Madison, Wis.

Central Culvert Co.
Ottumwa, Iowa

TECHNOLOGY DEPT.

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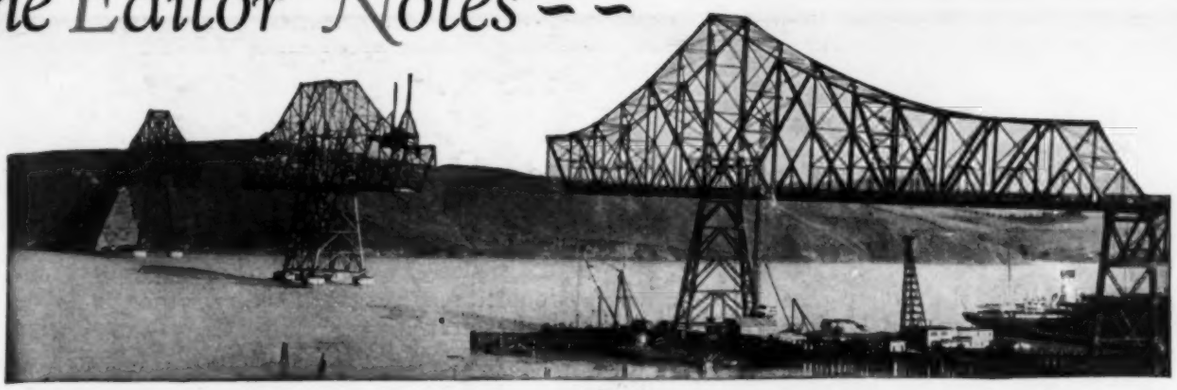
The Editor Notes - -



Face Brick in "Flowing" Colors

MODERN TRENDS in the increased use of color for a great variety of decorative purposes are manifesting themselves in the commercial building field. One manufacturer has just announced the production of glazed face brick in six or eight shades of any selected color to produce in a single structure the effect of flowing color, without banding. Arrangements for shipping have been perfected whereby glazed brick of different shades arrives on the job, properly labeled, in the order in which it is to be used, requiring no selection on the part of the masons. Tests of the variously shaded brick have resulted in the creation of some striking effects in flowing color design for a skyscraper office building, the face of the structure changing gradually from a dark brown for the lower stories to white at the top. The color changes are imperceptible from floor to floor. The normal horizontal lines of the street, accentuated for a few stories, are gradually diminished and changed into the natural vertical effect of a tall building.

Rewards for Speedy Construction

In Connecticut the state highway department has adopted a plan that rewards a contractor for speedy construction. The method, as outlined by the New England Road Builders' Association, is to charge liquidated damages at a certain daily rate for each day that the contract is in operation. The daily time charge is deducted from each monthly estimate. While no specified number of days is set by the department the contractor must add to his unit prices an amount sufficient to cover the total time charge for the number of days he requires for the job. Under this arrangement it is clear that a speedy contractor has a distinct advantage over a slower competitor and can cash in on his speed.

CONSTRUCTION METHODS

A monthly review of modern construction practice and equipment

ROBERT K. TOMLIN, *Editor*

Editorial Staff

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A McGraw-Hill Publication

Tenth Avenue at 36th Street, New York

Overemphasis on a Single Detail

At this season of the year when orders are being placed for equipment to handle construction work now being placed under contract the following advice from a manufacturer of excavating machinery is timely: "Don't let a high-pressure salesman oversell you on one detail. Some builders talk only of their traction, but it takes more than a good traction to make an excavator. Other builders lay stress on auxiliaries, such as self starters, but it takes more than a self-starter to make a low-cost dirt mover. Every part must be right to produce low-cost yardage."

I. S. Holbrook

I. S. Holbrook, advertising representative in the metropolitan district of New York for *Construction Methods*, died in Miami, Fla., March 7. Associated with *Engineering Record* for years before the consolidation that created *Engineering News-Record* in 1917, he was a pioneer in the field of engineering and industrial publishing. A veteran in the service of the McGraw-Hill Publishing Co., he was a powerful factor in the growth of both *Construction Methods* and *Engineering News-Record*.

Concrete "Stilts" for Bridge Pier Support

SOMETHING different in methods for providing deep foundations for bridge piers and other structures is illustrated and described in the article on pp. 34-37 of this issue. Briefly, the scheme involves the support of the piers on clusters of long concrete "stilts," each formed by creating a deep, vertical mud-filled shaft, sinking corrugated metal casing through the soft material before any excavation is done and then removing the semi-fluid core and filling the cylinders with concrete. The field methods involve the combined use of open air and compressed-air operations. The crux of the process is the creation of the vertical shaft of soupy mud through which to "jockey down" the steel casing. This is accomplished by a revolving cutter-head fed by water under pressure to soften the material. In sub-surface materials of proper character the method appears to have numerous applications in substructure work where it becomes necessary to reach a firm foundation at considerable depths.

Building Code Vagaries

Antiquated building codes must be revised to permit more economical design and construction. The following example of inconsistent requirements is cited by H. H. Fox, vice-president of the Turner Construction Company: Most building codes require that the curtain wall under a window shall be 8 in. thick if of concrete or 12 in. thick if of brick; yet they do not establish a minimum height for this curtain wall and cannot object if the window is carried all the way down to the floor. If the building and fire department authorities are willing to accept a pane of glass from the floor level to a point 2 or 3 ft. above it, they should certainly approve something thinner and cheaper than the prescribed masonry wall.

Responsibility, the Present Need

SINCE the collapse of speculative values so rudely upset its balance last October, American business has turned hopefully toward the construction industries.

Under the leadership of the President, millions have been appropriated for public works by the national government, the states and our cities; to this outlay private industry and public utilities have added their millions, all to provide the work and the wages that will help to maintain a normal volume of trade.

All this means that the construction industries have assumed a new importance in the economic scheme. They have been accorded a new recognition as the balance wheel of industry, a reservoir of buying power that, wisely controlled, can help mightily to carry the general progress over the dead center of the business cycle. In such a role they can win and hold a new respect in the eyes of American business.

But with opportunity must come always a corresponding responsibility. In the present juncture the construction industries must be careful not to disperse lightly the capital thus entrusted to them. Rather must they reveal a redoubled sense of trusteeship for the general welfare.

Every dollar of these vast funds must be expended faithfully. Engineers and architects must plan wisely and economically; they must entrust their projects only to constructors of demonstrated skill, integrity and responsibility. The latter, in turn, must devote to the fulfillment of their contracts the utmost of their energy and skill, and each must resist the temptation to extend his operations beyond his physical and financial capacity to make good.

And, in their zeal for business, manufacturers, dealers and sureties must restrain the urge to grant excessive credits or write dubious bonds that would stimulate unwarranted expansion and foster a speculative condition no less unsound than that which culminated so unhappily last Fall.

Skill, prudence and common sense on the part of every element in the industry can help materially to reestablish the orderly progress of our prosperity; without these qualities the construction industries will defeat the purpose of the present effort and will stand discredited, not alone in their own house but also in the esteem of the business community.

Willard Chevalier

Publishing Director

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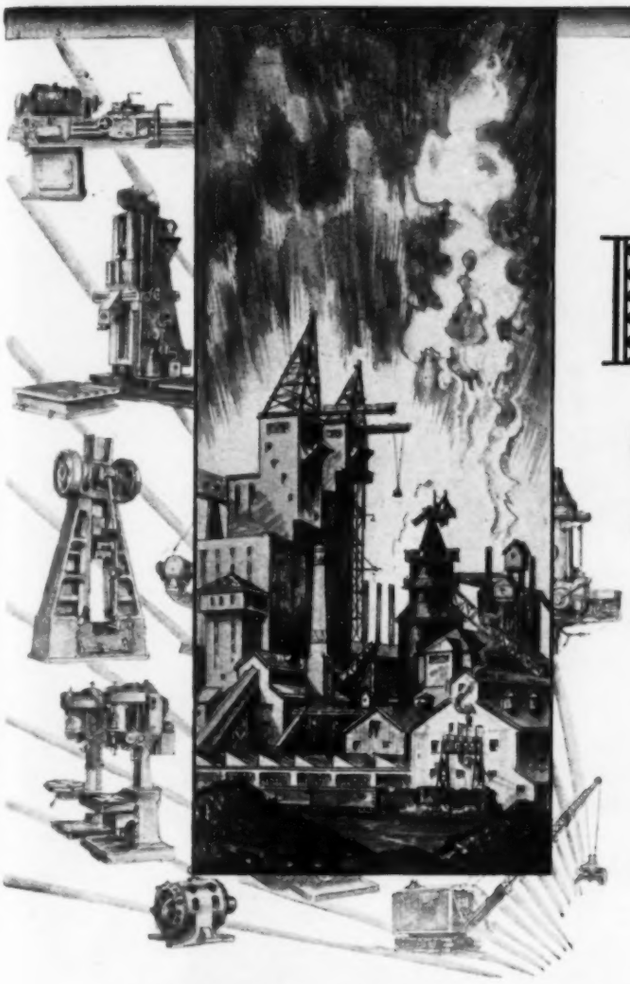

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Commercial Equipment Corporation, affiliation of Commercial Credit Companies, provides a further financing service to industry. Its method of financing complete installations as a unit, requiring two or more varying types and makes of equipment, has been approved and endorsed by many of the country's leading engineers.

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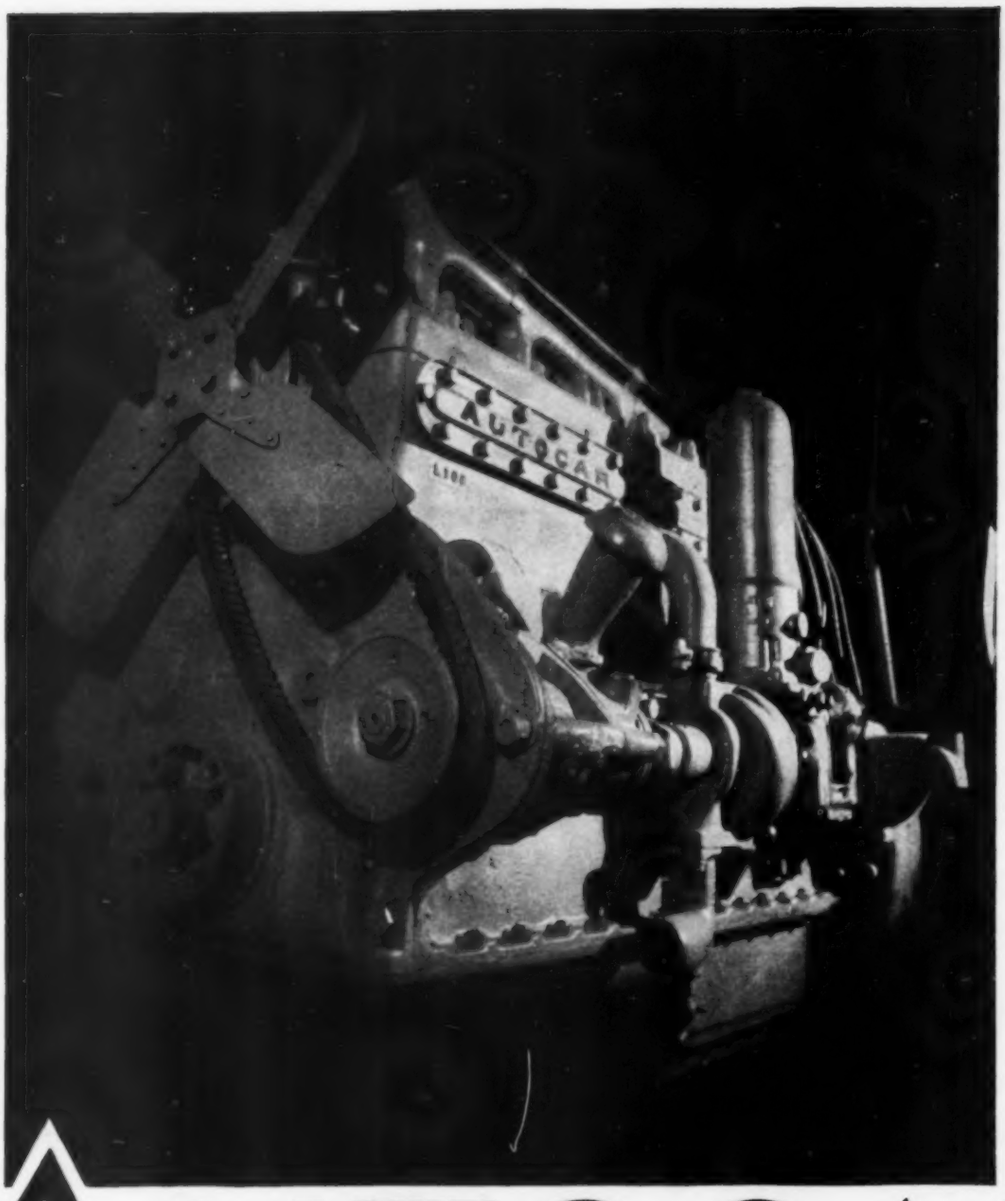

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presents The "BLUE-STREAK" SIX..

PRECISION BUILT

Greater rigidity, less vibration, better cooling, positive lubrication. A modern motor for today's increasingly heavy duty. Write for details.

AUTOCAR TRUCKS

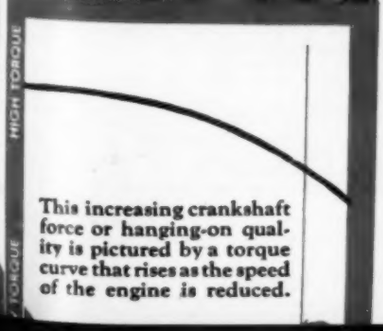
The AUTOCAR Company, Ardmore, Pa., Established 1897

TRUCK HORSE POWER *for heavy duty work*

NORTHWEST *Engines are* slow speed *power plants*

COMPARE Northwest engine speeds with those of other shovel and crane manufacturers. Note the lower speeds! Northwest gives you "truck-horse" power, power that doesn't stall in tough shale, rock or hard pan. Gasoline and heavy oil power plants give you *motor car dependability* free from the troubles of the Diesel.

Pag 5



This increasing crankshaft force or hanging-on quality is pictured by a torque curve that rises as the speed of the engine is reduced.

NORTHWEST

NORTHWEST ENGINEERING CO.

The world's largest exclusive builders of gasoline, oil burning and electric powered shovels, cranes and draglines

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The best buy on the marke today

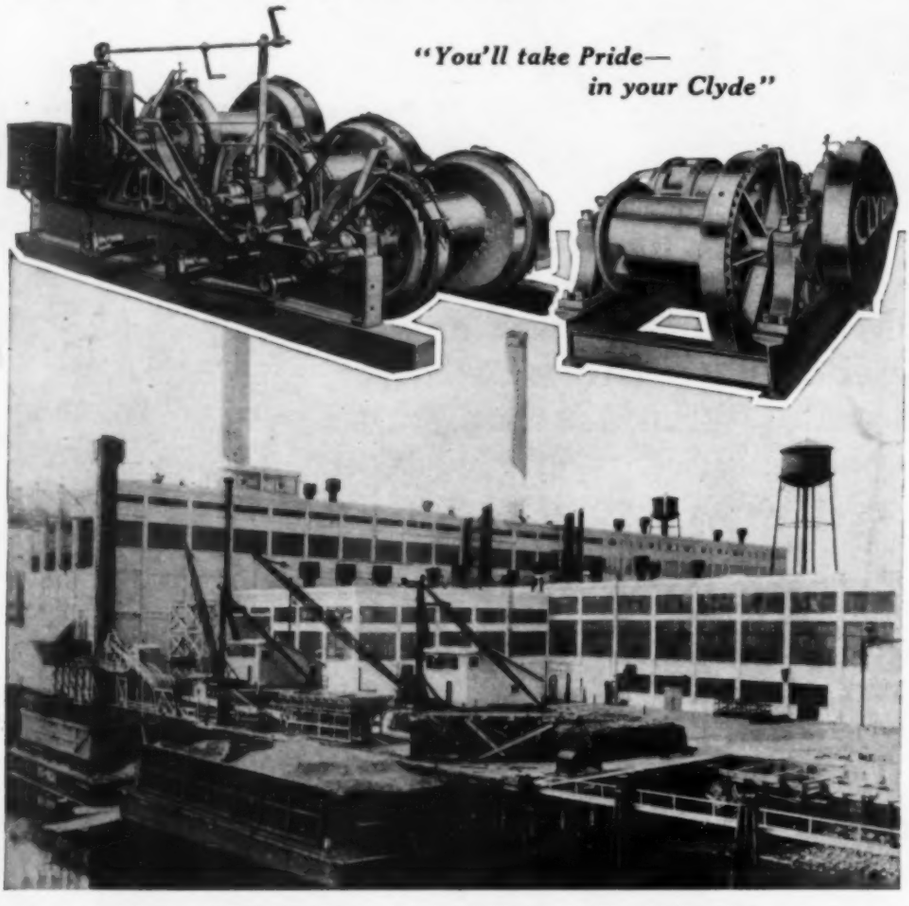
CLYDE HOISTS-DERRICKS

Quality Equipment:—

Clyde hoists and derricks are positive insurance against worry and trouble. Designed for performance and built for endurance they are very suitable for permanent installations for any industrial plant.

Below is shown the plant of the National Paper Products Co., Washington, where they have installed 2 Clyde 10-ton steel derricks, each operated by a 100-horsepower, 3-drum electric hoist with independent boom swinging attachment. These derricks unload the chips from the barges, conveyors carrying them to the plant.

"You'll take Pride—
in your Clyde"



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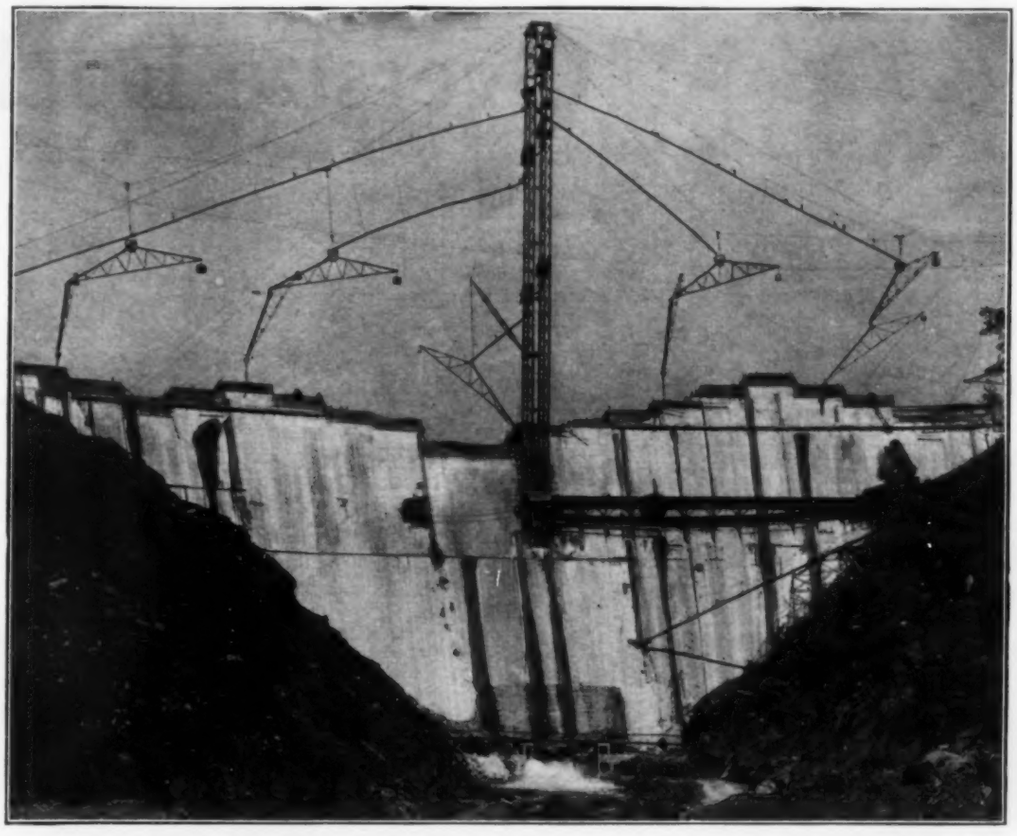

The Lakewood Concrete Placing Plant shown above with 500-ft. double tower placed in record time 615,000 cu. yds. of concrete for the Atkinson Construction Company on the Pardee Dam in California

Setting the Pace!

Lakewood Chute—the original half round arch band section—is the preferred chute for the handling of dry or large aggregate concrete.

Job after job has proved it.

Send for Bulletin 23-R—It has full details

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LAKEWOOD

The Lakewood Engineering Co., CLEVELAND · O.

Over 200,000 Yards... Oversize Bucket

A Link-Belt Dragline with 45 ft. boom and 1¼ cu. yd. bucket at work on lake front improvement in Chicago

THE above are the features of the story of service rendered by the Link-Belt K-30 Dragline belonging to Peterson & Simmons, drainage contractors of Fairfax, Missouri.

Under date of January 9, Mr. S. J. Peterson of the above company wrote the following unsolicited testimonial:

"We expect to get through with the job at Elmo, Mo. in about a week if the weather does not get too bad on us. That will make 165,000 yards since October 18.

"This K-30 has dug considerably over 200,000 yards since we got it. It has caused *less trouble than any machine we have had anything to do with.* Nothing has been spent on it except for brake lining."

It should be noted that this 1 cu. yd. machine had been equipped by the owner with a 1¼ yard bucket. This is the fourth Link-Belt machine that Mr. Peterson has purchased.

The range of sizes in Link-Belt Crawlers is up to two full yards capacity, heavy duty units, gasoline, Diesel or electric power.

Send for Book No. 1095

LINK-BELT COMPANY

Builders of Locomotive Cranes for 30 years. Portable Loaders—Crawler Cranes—Shovels—Draglines

Chicago, 300 W. Pershing Road — Offices in Principal Cities

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LINK-BELT

SHOVELS + CRANES + DRAGLINES

A 1/2-YARD SHOVEL – CRANE – DRAGLINE – *Built to Earn Extra Profits*

Look into the 1020 — it will give you greater respect for 1/2-yard machines. As rugged and reliable for its work as a big quarry shovel. Users prove it — and there are *more* small Bucyrus-Erie Shovels in use than any other make! The 1020 reflects the experience of building 10,000 machines. Check these features: Ball-bearings . . . special steels . . . unit steel construction . . . over-size shafts, bearings and clutches . . . gears incased and running in oil. *Write for bulletin on the 1020*

Power shovels, clamshells, cranes, draglines, dragshovels, ½ to 16-yard capacity — electric, steam, gasoline, Diesel, gas + air, Diesel + air.

Dipper, hydraulic and placer mining dredges.

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THE FUTURE IS WRITTEN IN STEEL

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STRUCTURAL STEEL is the bone and sinew of every great modern building and bridge. It lends courage to design, inspiration to imagination. Founded on steel's strength . . . confident in steel's known safety . . . expressive of steel's adaptability . . . rise the cities of the future.

Equally important is the service steel must perform in the development of small structures—homes, small apartment and mercantile houses, schools and small bridges. Here also steel brings sooner occupancy, greater security, longer life. Structural steel eliminates shrinkage; facilitates alterations or additions. In small as well as large bridges, steel long since proved its economic and esthetic excellence.

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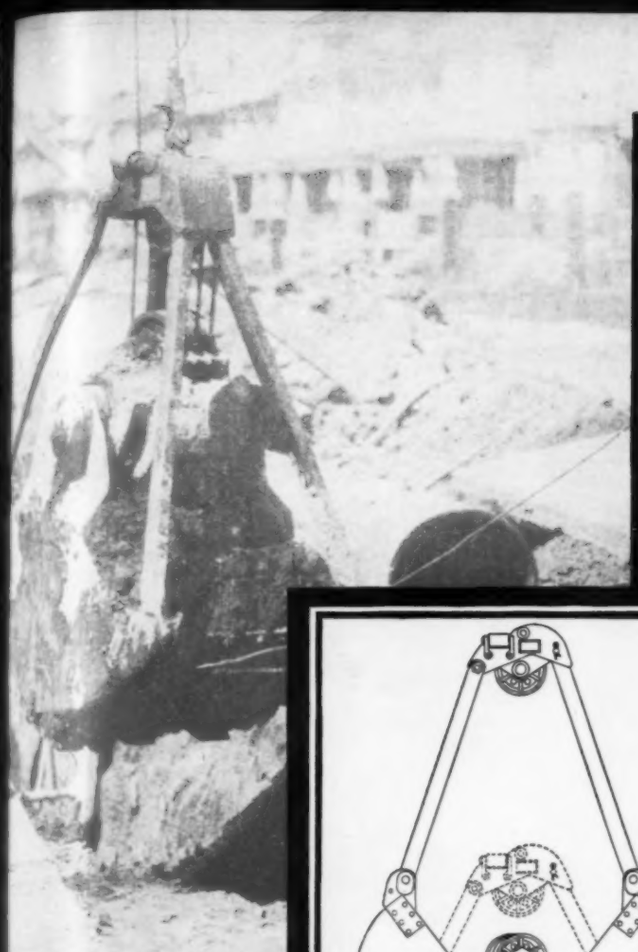
The co-operative non-profit service organization of the structural steel industry of North America. Through its extensive test and research program, the Institute aims to establish the full facts regarding steel in relation to every type of construction. The Institute's many publications, covering every phase of steel construction, are available on request. Please address all inquiries to 200 Madison Avenue, New York City. District offices in New York, Worcester, Philadelphia, Birmingham, Cleveland, Chicago, Milwaukee, St. Louis, Topeka, Dallas and San Francisco.

AN ENLARGEMENT OF THIS HUGH FERRISS RENDERING, ON SPECIAL STOCK FOR FRAMING, WILL BE MAILED WITHOUT CHARGE TO ANY ARCHITECT, ENGINEER OR BUSINESS EXECUTIVE

AMERICAN INSTITUTE OF STEEL CONSTRUCTION

STEEL INSURES STRENGTH AND SECURITY



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Concentration of weight low in the bucket construction where it is most effective, enables an Owen Bucket to dig deeper into material. This vital weight is located on the centershaft where it directly offsets a tendency to lift, caused by the upward pull of the closing cable.

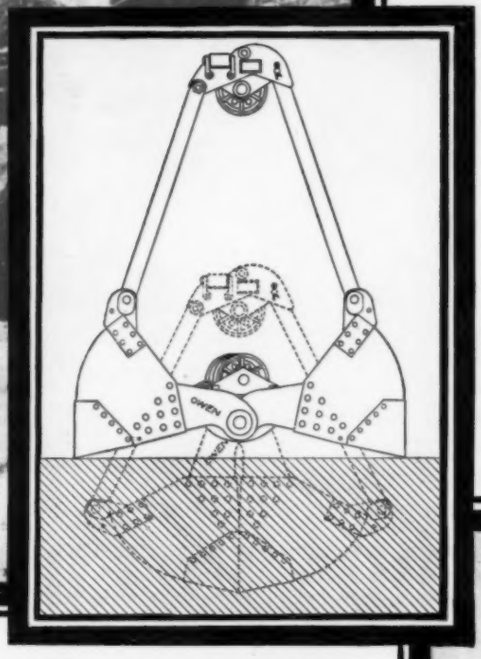
Moreover, in an Owen this "live" weight is completely utilized by the closing power, delivering the force equally to both jaws. These features also enable the bucket to dig at sharp angles without toppling.

Digging power can be increased to suit special requirements by bolting additional weight, in the form of a jacket, to the main counterweight. The result is more efficient operation, bigger grabs, more work done in less time.

Write for a Folder explaining the 17 Features in detail—or for a Catalog containing all the Owen Bucket types.

THE OWEN BUCKET COMPANY

6023 Breakwater Avenue Cleveland, Ohio



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1. One-piece steel crosshead.
2. No wear in upper or lower arm ends.
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4. Adjustable undiminished closing power.
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6. Long arm bolt bearings sealed from grit.
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8. Closing cable is protected against excessive wear.
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10. Cable clips eliminated.
11. Sealed center shaft bearings.
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13. Penetration and clean dumping.
14. Dropping shocks absorbed, eliminating breakage.
15. Rigid shell construction.
16. Heavy duty high carbon drop-forged steel teeth.
17. Lips or teeth points hit first.

Owen Buckets

COLAS TRIUMPHS IN FRANCE

LA Place de Triomphe and l'avenue des Champs Elysees are Colas-built — a significant fact in view of the triumph Colas has won in France. The use of this outstanding cold asphalt road emulsion by French engineers has grown steadily in the past five years until today thousands of miles of French roads are built with Colas.

All over the world Colas has proved its merit — withstanding floods, extreme heat and cold, sudden temperature changes, in fact, every climatic condition. It is attaining an equal record in America. If you are responsible for the construction and maintenance of roads you should know more about Colas. Write for literature and specifications.

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COLAS REG. TRADE MARK

BUILDS DURABLE LOW-COST ROADS

"HERCULES" RED-STRAND
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WIRE ROPE

An Economical Shovel Rope—and WHY

In the first place, "HERCULES" (Red-Strand) Wire Rope is economical because of the yardage it can handle for each dollar of its cost.

But that is not all. It costs money to put on a new rope and production work stops while it is being done. The long life of "HERCULES" makes changes less frequent, which means a big saving in both time and money.

—And the qualities that make "HERCULES" (Red-Strand) Wire Rope an economical shovel rope also make it economical for all kinds of work that requires strength and stamina.

Made Only by **A. Leschen & Sons Rope Co.** Established 1857

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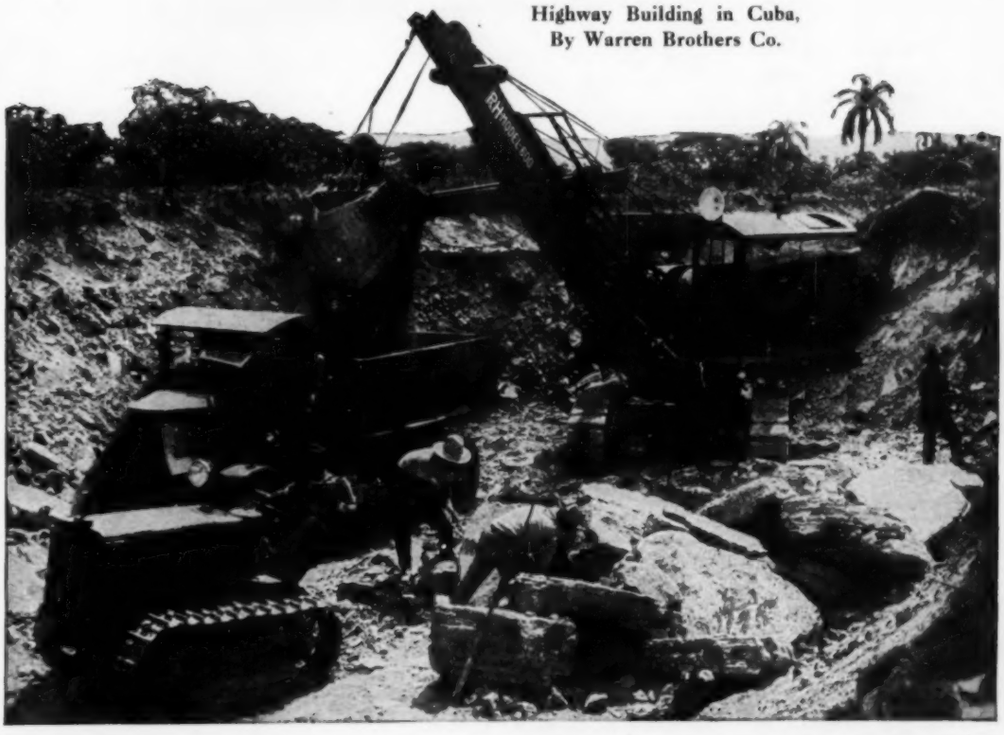

Ransome 7-S

The 7-S discharges a full batch in from 7 to 9 seconds.

The antelope is fast as lightning—small in size, light in weight. And that just describes the 7-S—plus a capacity for easily handling a two-bag batch of a 1—1½—3 mix—or a one-bag batch of a 1—3—6 mix.

An ideal small mixer—built like the big Ransome Mixers and Pavers—and backed by Ransome's experience of over eighty years.

NORTHERN KINGS FOR CONCRETE HANDLING

A 60-ft. Northern King placing mixed concrete for walls.

Placing concrete on part of the Chicago Drainage Canal; a 60-ft. Northern King on the job.

A 75-ft. Northern King places mixed concrete in hopper.

Gulfport, Miss., Sea Wall with a Northern King conveying concrete to forms.

PIONEERED by Northern, the use of conveyors for "pouring" concrete is today widely accepted. Modern construction has welcomed the efficiency of this new day method. It saves time, money and material.

Northern King Conveyors, portable or mounted on the new PA Power Chassis (which makes them self-propelled) afford the last word in concrete handling equipment.

From mixer to forms, Northern Kings elevate the concrete and deposit it as a uniform aggregate. And with the Northern King one man handles the whole operation, eliminating costly labor and towers or other equipment. More, Northern Kings speed up the work, place concrete faster and in better condition.

Northern Kings are available in standard lengths, or are built to order for special jobs.

There are interesting facts for the contractor in our Bulletin, "Concrete Handling." Write for a copy; it is free for the asking!

NORTHERN "BUILT BETTER SERVICED BEST" MATERIAL HANDLING EQUIPMENT

Write for Details and Prices

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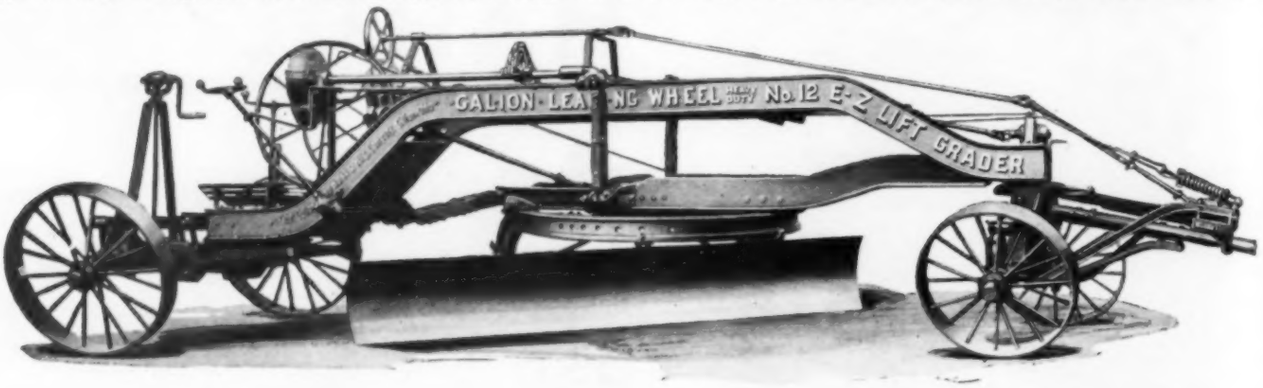
THE AUTOMATIC SKEW AXLE=

AN OUTSTANDING DEVELOPMENT-



IN GRADER CONSTRUCTION

Galion Distributors

W. A. Adams Tractor & Equip. Co., Raleigh, N. C.
R. S. Armstrong & Bro. Co., Atlanta, Ga.
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Frankfort Equip. Co., Frankfort Ky.
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Hall Perry Machy. Co., Butte, Mont.
Herd Equip. Co., Oklahoma City, Okla.
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Lewis-Patten Co., San Antonio, Texas
Lewis Tractor & Machinery Co., Fargo, N. D.
Marsh Equip. Co., Colby, Kan.
Miller & Requarth, Springfield, Ill.
Morrow Auto Co., Albuquerque, New Mexico
H. W. Moore Equip. Co., Denver, Colo.
Morrisey Easton Tractor Co., Vicksburg, Miss.
Murphy & Murphy, Little Rock, Ark.
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G. C. Phillips Tractor Co. Inc., Birmingham, Ala.
Power Equip. & Service Co., New Haven, Conn.
F. Ronstadt Co., Tucson, Ariz.
Salina Tractor & Thresher Co., Salina, Kan.
Bert Smith, Enid, Okla.
Smith-Booth-Usher Co., Los Angeles, Cal.
Standard Road Equip. Co., Rockford, Ill
W. H. Stoutenburg, Penn Yan, N. Y.
Tennessee Tractor Co., Nashville, Tenn.
F. E. Vaughn, LaCrosse, Kan.
Virginia Road Machy. Co., Richmond, Va.
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To hold the loaded mouldboard against heavy work has ever been one of the biggest problems in grader construction. By combining the leaning wheel with the automatic skew axle Galion Adjustable Leaning Wheel Graders have an ability to hold to heavy work never before attained in a drawn grader.

EASY TO OPERATE

Adjustment is made by a double machine-cut worm screw operated by crank from the platform. Screw locks the adjustment automatically in any position.

DURABILITY AND STRENGTH

Nothing complicated about construction . . . . nothing to get out of order. Operating mechanism is ON THE FRAME, supported and protected by heavy frame cross members, not on the rear axle.

LOAD AND DRAFT CENTERED

Weight and draft on rear axle are always borne at two fixed points instead of being shifted to one side or the other to place undue strain on one wheel and one side of the axle.

Write for catalog completely describing Galion Graders and other road machinery.

The Galion Iron Works & Mfg. Co.

Galion - - - - - - - - - Ohio

LEVEL OUT LOW SPOTS AT LOW COST

IT'S JUST A ONE-HAND LIFT with BLACKHAWK HYDRAULICS

TAKE Iowa, for instance. A big road construction and maintenance program going on. Plenty of low spots. Old methods of leveling them too slow, hard and expensive. Hundreds of Blackhawk Hydraulic Jacks now do the work all over the state — quickly, easily, economically.

With Blackhawks on the job there's nothing to it. Just line up these easily portable jacks across and under the paving at intervals of eight feet. Exert a little one-hand pressure on each handle. Flow in the sand. That's all!

Blackhawk hydraulic efficiency multiplies hand pressure into tons of power. Lifts that would break a man's back with a mechanical jack are easy with a Blackhawk. The best mechanical jack soon wears out itself and the laborer too. A Blackhawk is good for a long life and good to the operator as well.

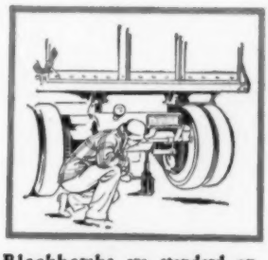
Speed up your lifting jobs. Lower their costs. Equip with Blackhawk Hydraulic Jacks. There's a full line of them, 1 to 75 tons capacity, and each a one-hand lifter.

See your jack dealer. Mail coupon to us.

BLACKHAWK MANUFACTURING CO., Dept. CM
Milwaukee, Wis.

Also world's largest manufacturer of socket wrenches

Blackhawk Hydraulic Jacks proved *80 times quicker* than mechanical jacks in skidding this 2093 ton bridge.



Blackhawks are standard on the leading heavy trucks. Their use also simplifies pressing, bending, straightening, and lifting operations in the shop.

BLACKHAWK HYDRAULIC JACKS

Tramway carrying 220 tons hourly of sand and gravel for the construction of the Pardee Dam in California. Built for the contractors—Atkinson Construction Co.

Locked Coil Track Cable used on American Steel & Wire Company Tramways

AMERICAN
TRENTON-BLEICHERT SYSTEM
Aerial TRAMWAYS

This system provides an economical and dependable method of transporting material in every kind of country—over mountains, valleys, and rivers; to and from locations entirely inaccessible by surface routes.

We supply everything from the preliminary plan to the completed tramway. Let our engineers help you with your transportation problems.

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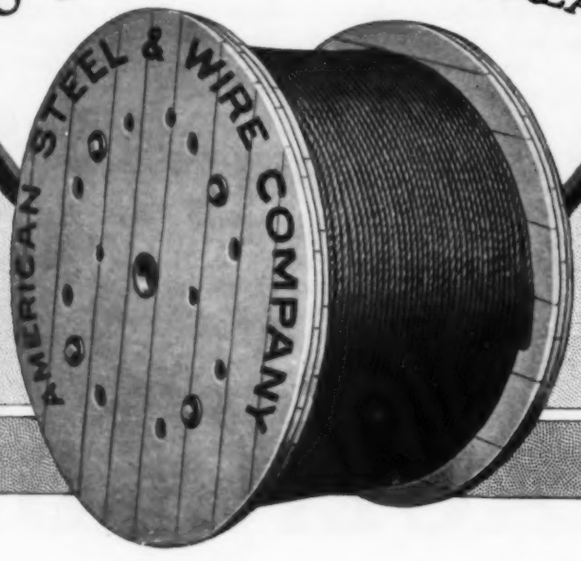
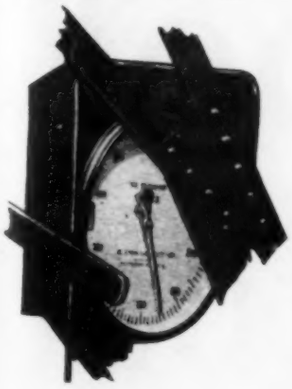
NO GRADE TOO STEEP
NO DISTANCE TOO GREAT



LARGEST MANUFACTURERS OF WIRE ROPE IN THE WORLD



Batching by WEIGHT

THE Haiss Weighing Hopper makes advance stock pile storage available, also, where "specifications" call for weight measuring of batches. And, as Morris C. Soper*, Contractor, of Seneca Falls, N. Y., points out from his last year's experience, "if railroad delays once pulled us down to a one day's supply of aggregates, what would have happened if we hadn't stock piled 75 cars in advance along the 6-mile stretch before we started laying the concrete".

*He stands fourth in New York State in concrete pavement laid in 1929.

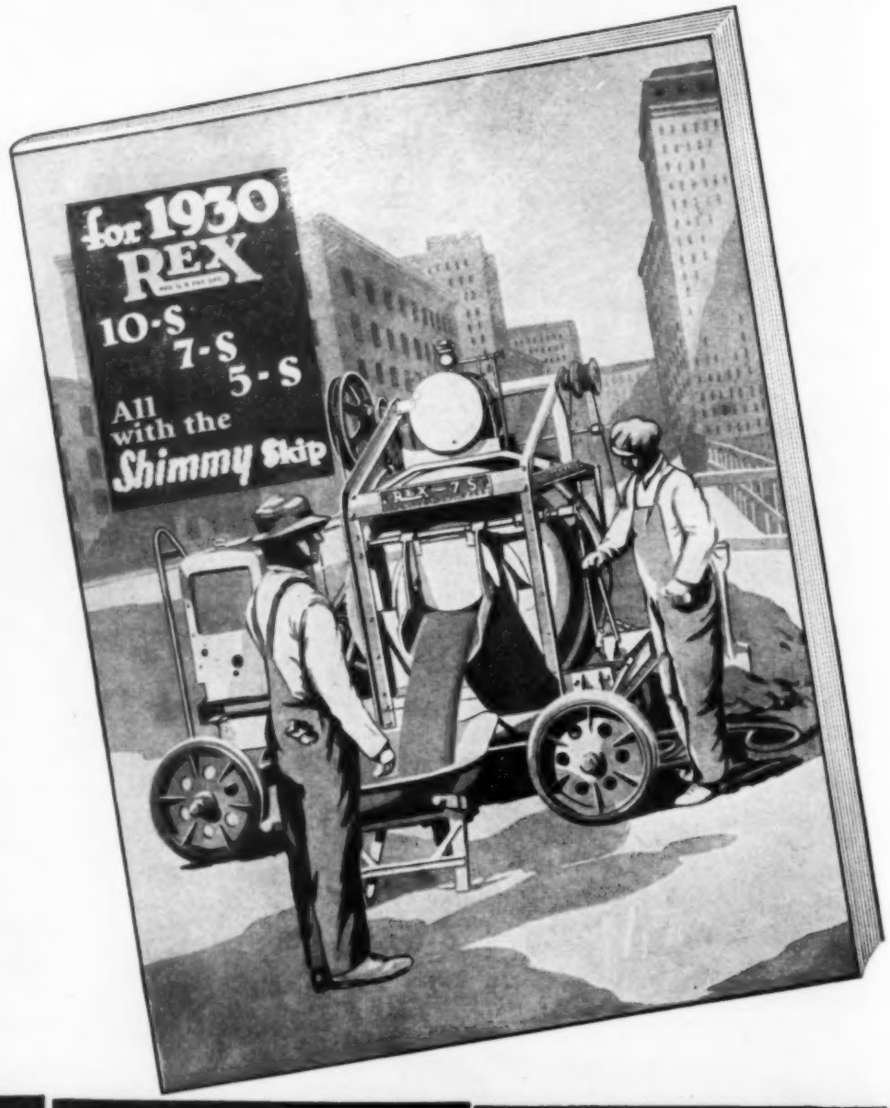
Detail information and Loader Catalog on request.

GEORGE HAISS
MANUFACTURING CO., INC.
139TH ST. AND CANAL PLACE
NEW YORK, N. Y.
Representatives in Principal Cities

H-667

HAISS *Volume and Weighing Batch Hoppers*
and "Path Digging" LOADERS

In this Book the Greatest



The Rex 10-S, 7-S and 5-S all have the New Rex Shimmy Skip—

the one-man end controls

the high-speed skip and fastest discharge

no-leak, accurate water

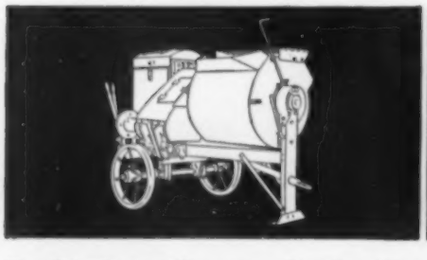
The Rex 10-S, 7-S and 5-S all—

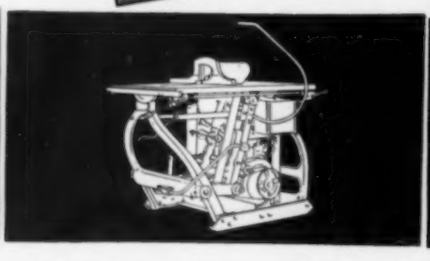
weigh less than any machines in their classes

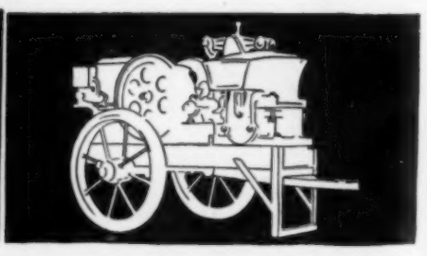
have a shorter overall length than any machines in their classes

And each mixer is an all-steel job, with pressed steel drum heads and rollers—the finest bearings employed in that type of machine—no cast iron—no open gearing.

Try to beat mixers like that.







Rex Diaphragm Pumps • Rex Saw Rigs • Rex Plaster and Mortar Mixers • Concrete Mixers • Pavers • Plaster Mixers

You Will Find Story of Mixer Value Ever *Written*

This catalog on the Rex 10-S, 7-S and 5-S is not just another catalog.

It is a printed record of what every mixer should give you if it is to be the finest machine your dollars can buy.

By actual comparison of weight, compactness, speed and such features as the Shimmy Skip, End Controls and Accurate No-Leak Water—these three great Rex Mixers are way out ahead of their respective class parades.

But all these things tell only part of the story.

For 1930, many Rex prices are reduced to new, low levels, below prices of more cheaply built mixers.

We check manufacturing costs carefully to establish a fair profit—and we pass on all savings as soon as those savings are made.

As a result, this book is your handbook of mixer value—a standard by which to judge all 10-S, 7-S and 5-S Mixers—on any basis you wish: design, features, performance or price.

A copy of the book can be had by returning this coupon filled in. Send it today.

REX
CONSTRUCTION EQUIPMENT

CHAIN BELT COMPANY, 764 Park St., Milwaukee, Wis. Cable Address: Beltchain

Check catalogs you wish and mail today:

Tilter	☐	Diaphragm	☐	Saw Rigs	☐
5-S,7-S,10-S	☐	Centrifugal	☐	Plaster & Mortar Mixers	☐
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28-S Mixer	☐	Road Pumps	☐		
27-E Paver	☐				

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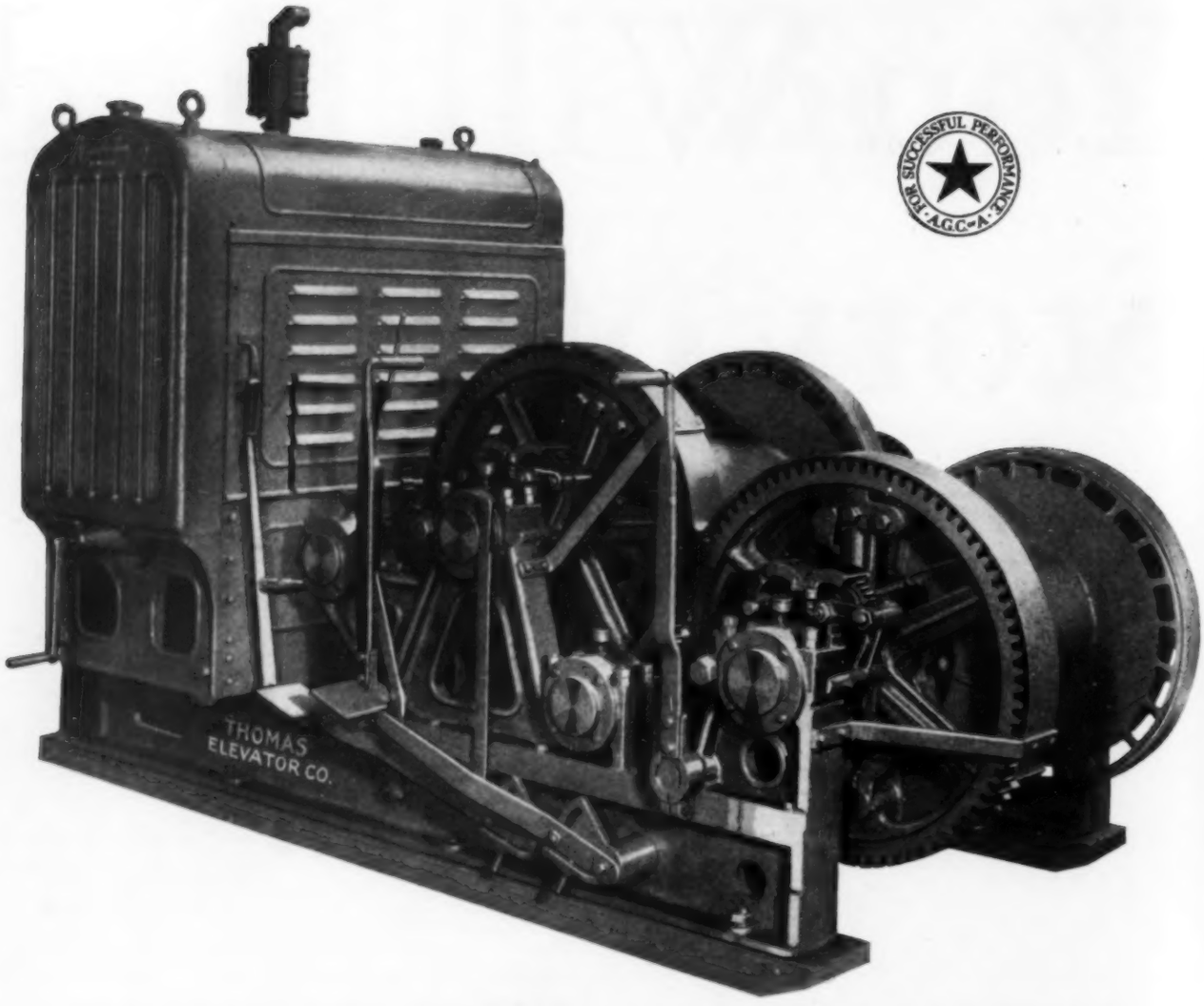
City..... State.....

Pumps • Saw Rigs • Chain • Sprockets • Buckets • Transmission • Elevators • Conveyors • Traveling Water Screens



THE THOMAS SIXTY

THE latest development in gasoline hoists, a real HE hoist built for hard service. The Thomas Sixty is a Thomas Band Friction Type Hoist and has the celebrated Thomas Automatic Motor Brake — a great safety feature. It is powered with a Waukesha 5⅜" x 6¼" four cylinder engine which is very conservatively rated 60 h. p.

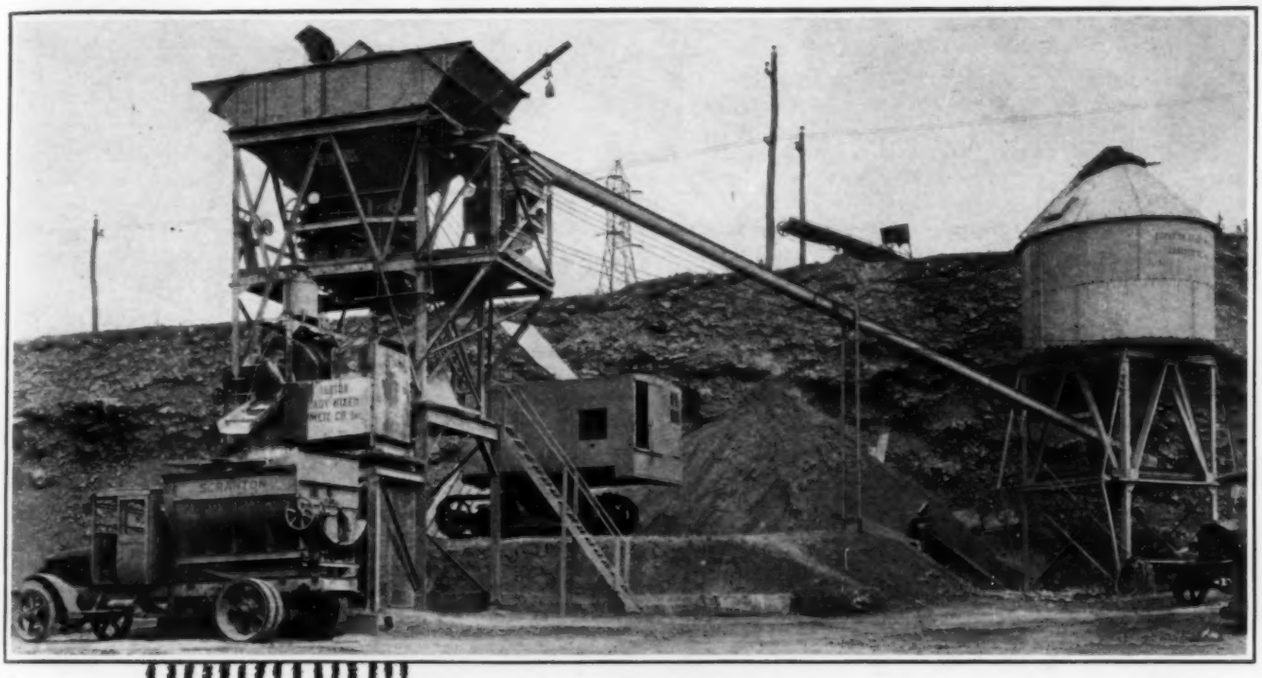
THOMAS ELEVATOR COMPANY

20 SOUTH HOYNE AVENUE.

CHICAGO ILLINOIS

A complete job by

BLAW-KNOX



READY MIXED CONCRETE PLANTS

Agitator TRUCK BODIES

BLAW-KNOX

The efficient plant of the Scranton Ready Mixed Concrete Co., Scranton, Pa., is an illustration of Blaw-Knox ability to design and furnish complete equipment for the PRODUCTION and HAULING of Ready Mixed Concrete.

—the moisture-proof Cement Bin

—the conveyor arrangements

—the 51-ton self-cleaning Batcherplant with a double Weighing Batcher for the sand and stone and a separate Weighing Batcher for the cement

—and three Blaw-Knox AGITATOR Truck Bodies which haul the mixed concrete and prevent segregation of the aggregates

the entire plant layout is a product of Blaw-Knox engineering experience and skill.

Blaw-Knox Engineers will be glad to do a similar job for you. Please mail the coupon for more complete information.

BLAW-KNOX COMPANY
2086 Farmers Bank Bldg., Pittsburgh, Pa.

I am interested in the production and hauling of Ready Mixed Concrete

Send me complete information about
☐ Blaw-Knox Ready Mixed Concrete Plants
☐ Blaw-Knox AGITATOR Truck Bodies

Name _____ Company _____

Street _____ City _____ State _____

Get this

CLETRAC
20
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The Complete Line of Crawler Tractors

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A NEW CLETRAC IN THE ADVANCED POWER RANGE

Complete Outline of Cletrac's Power Service

THE coupon below — or a postal — will bring you *free,* this colorful new Cletrac portfolio. In a clever pocket on the inside you will find five strikingly illustrated catalog folders to tell you in picture and story the big things these five famous Cletrac models are doing in your field of work — how they are cutting costs — speeding up schedules — doing more kinds of work — setting up entirely new standards of efficiency and economy!

Amazing records for capacity and endurance have been made by every one of the rugged models in this famous line of tractors. What they offer you in the way of service or in helping you solve your problems of power, is clearly shown in this new Cletrac portfolio. There is no obligation. Merely mail a postal or the coupon below.

The Cleveland Tractor Co.
19323 Euclid Avenue **Cleveland, Ohio**

Fill Out and Mail the Coupon Today!

THE CLEVELAND TRACTOR CO.,
19323 Euclid Avenue, Cleveland, Ohio.

Send me the new Cletrac portfolio outlining Cletrac's power service.

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On the Job in the HOLLAND TUNNEL, *New York*

'Way below the ground, where working conditions are full of handicaps and where time is an important factor, Lowell Wrenches are used for driving tight thousands of *big* nuts.

Look at those two huskies pull. Just a *pumping* action, with never a stop for re-fitting the wrench to the nut. That's the big time-saving advantage of the Lowell ratchet feature.

And note the long leverage. Full power behind each pull. Lowell Wrenches are built for the job, with a thorough knowledge of the job learned through more than a half-century of wrench-making.

In almost every phase of construction there's room for savings with Lowells.

Let us show you how.

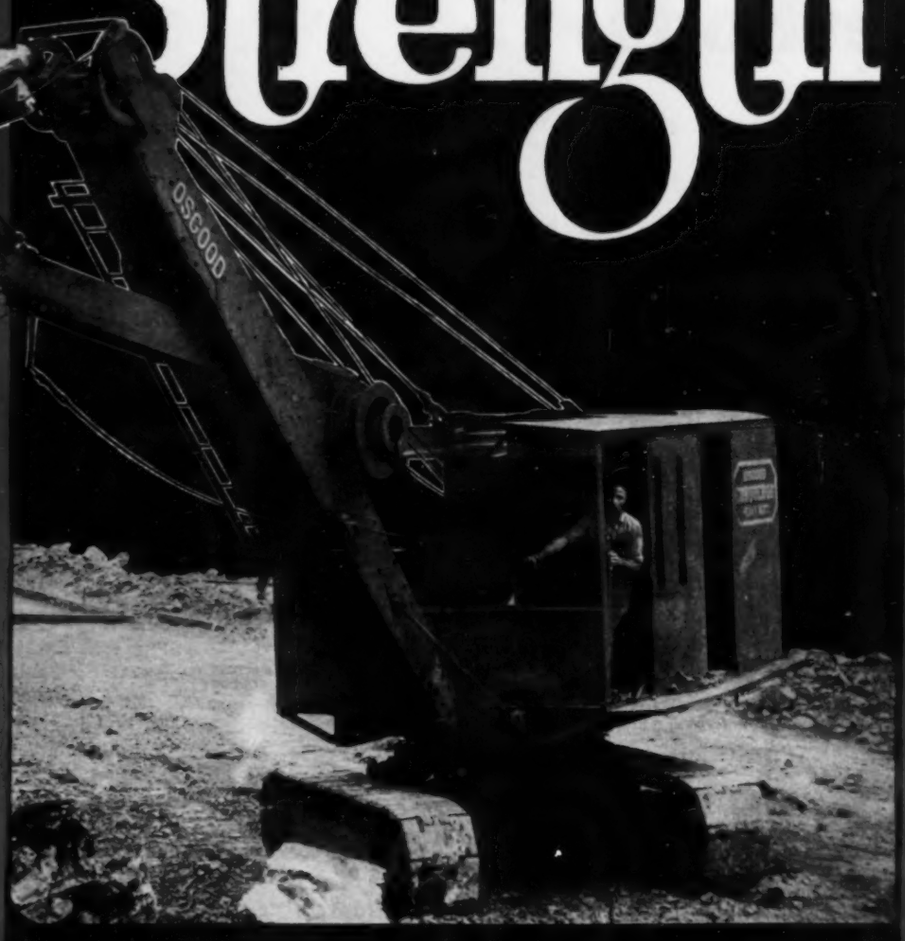
Send for Catalog "R"—it shows you standard wrenches, big wrenches for special work, and photographs of Lowells on the job.

LOWELL WRENCH CO.
WORCESTER, MASS.

LOWELL
REVERSIBLE
RATCHET
WRENCHES

Strength

One of four OSGOOD CONQUERORS owned by Robert Ferguson, Little Falls, N. J., working for the Dyer-Kane Company of Passaic, N.J., on their New York State Highway Job. A total of 140,000 cu. yards were moved—90% solid rock.



3/4 TO 6 YARDS
COMMANDER
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RAILROAD
GASOLINE STEAM
ELECTRIC
DIESEL

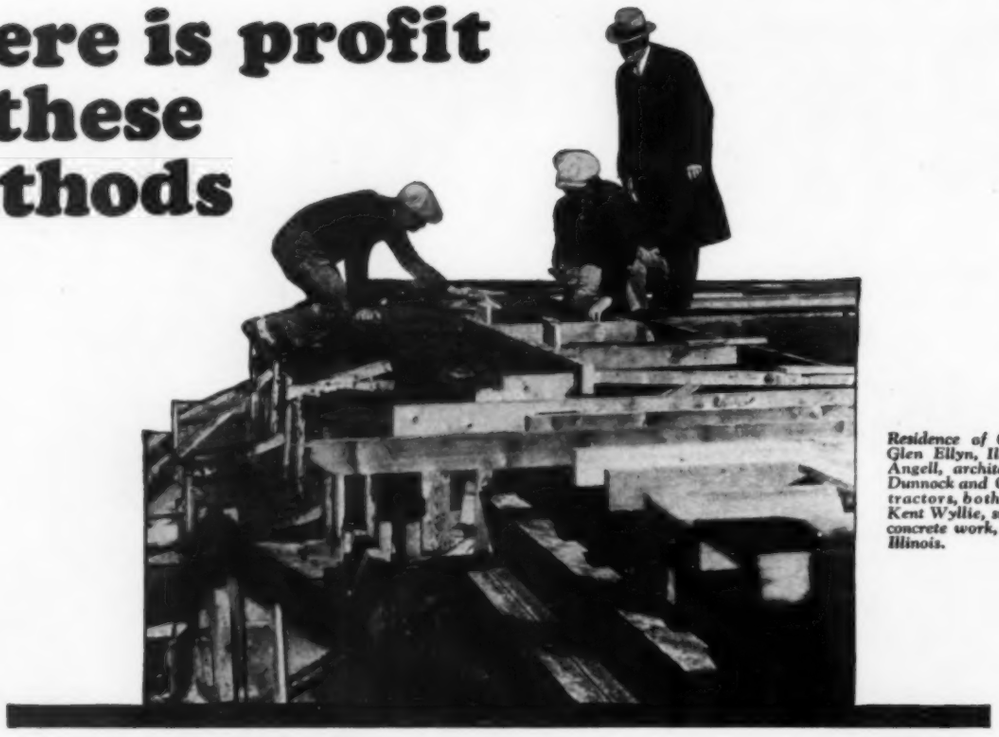
The truck frame of an OSGOOD is the pivot point of the machine. The OSGOOD centering gudgeon holds the cab in proper alignment with the truck at all times... This massive steel casting supports the entire weight of machinery, cab, and load.

SUPER STRENGTH at every vital point
LONG LIFE ~ MINIMUM UPKEEP
MAXIMUM SERVICE

The OSGOOD has the strength of a giant! Heavy steel castings resist terrific strains at every vital spot. All machinery is mounted on one large, open hearth annealed steel casting. The truck frame is built about a massive open hearth steel casting, and has hammered steel shafts and axles. The OSGOOD centering gudgeon adds more strength and stability. Armored type shovel boom for strength and resiliency. Cast steel hoisting and pull back drums mounted on extra heavy shaft. OSGOODS are built for hard work and plenty of it!

THE OSGOOD CO.
MARION OHIO

There is profit in these methods



Residence of G. T. Jennings, Glen Ellyn, Ill. Walker and Angell, architects; Boardman-Dunnock and Co., general contractors, both of Glen Ellyn; Kent Wyllie, sub-contractor on concrete work, Downers Grove, Illinois.

High-early-strength concrete, made with Universal Atlas methods and cement, saved weeks of time for the builders on this large residence.

"On time with a job may mean hundreds or thousands of dollars to the builder. Ahead of time brings additional profits. Behind time . . . loss!" says the publisher of *Engineering News-Record.*

The builder of this Glen Ellyn, Ill., residence saved more than 2 weeks by using ***high-early-strength*** concrete for floor slabs and for incasing the steel work. Tests showed this concrete, made with Universal Atlas methods and cement, was stronger in 3 *days* than concrete made by ordinary methods is in *21 to 28 days.*

Methods for obtaining ***high-early-strength*** concrete with the standard portland cement of the Universal Atlas Cement Co. (the same as used for ordinary work) will be sent on request. Just use the coupon.

Universal Atlas Cement Co.

Subsidiary of UNITED STATES STEEL Corporation

Concrete for Permanence

Universal Atlas Cement Co.
208 South La Salle Street, Chicago

Without obligation, please send me methods for securing high-early-strength concrete with the standard portland cement of the Universal Atlas Cement Co.

Name_____

Address_____

City_____ State_____

C. M. 4-30

PRODUCTS:

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PLANTS AT

Hudson, N. Y., Northampton, Pa., Universal, Pa., Buffington, Ind. Duluth, Minn., Hannibal, Mo., Independence, Kan., Leeds, Ala., and Waco, Tex.

OFFICES IN

Chicago, New York, Philadelphia, Boston, Albany, Pittsburgh, Cleveland, Columbus, Minneapolis, Duluth, St. Louis, Kansas City, Des Moines, Omaha, Oklahoma City, Birmingham and Waco

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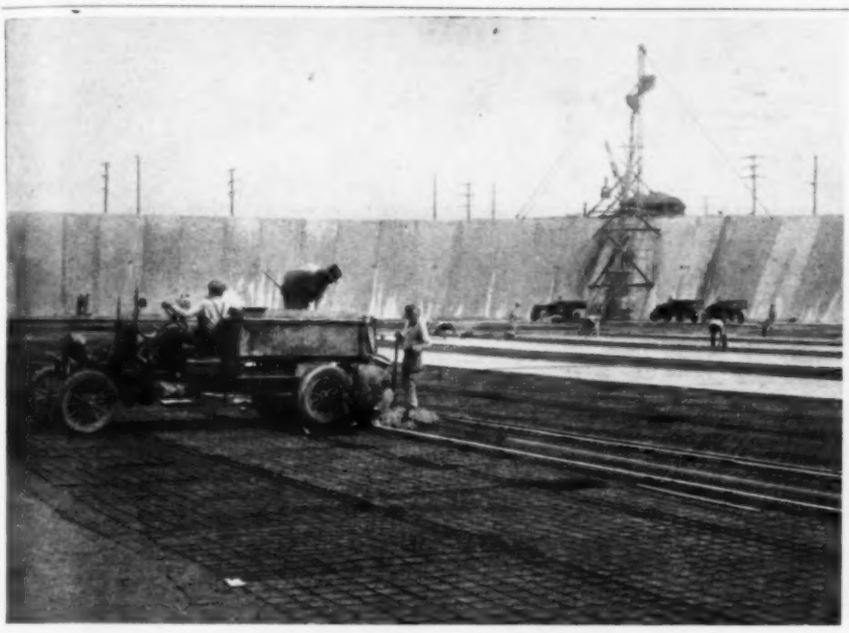
Construction Methods

A McGraw-Hill Publication—Established 1919

ROBERT K. TOMLIN, *Editor*

VOLUME 12 NEW YORK, APRIL, 1930 NUMBER 4



TRUCKS deliver concrete for floor slabs. Rolled earth subgrade is covered with 6-in. wire mesh reinforcing. Floor is poured in alternate strips

Trucks Distribute Concrete for

12-ACRE SLAB LINING

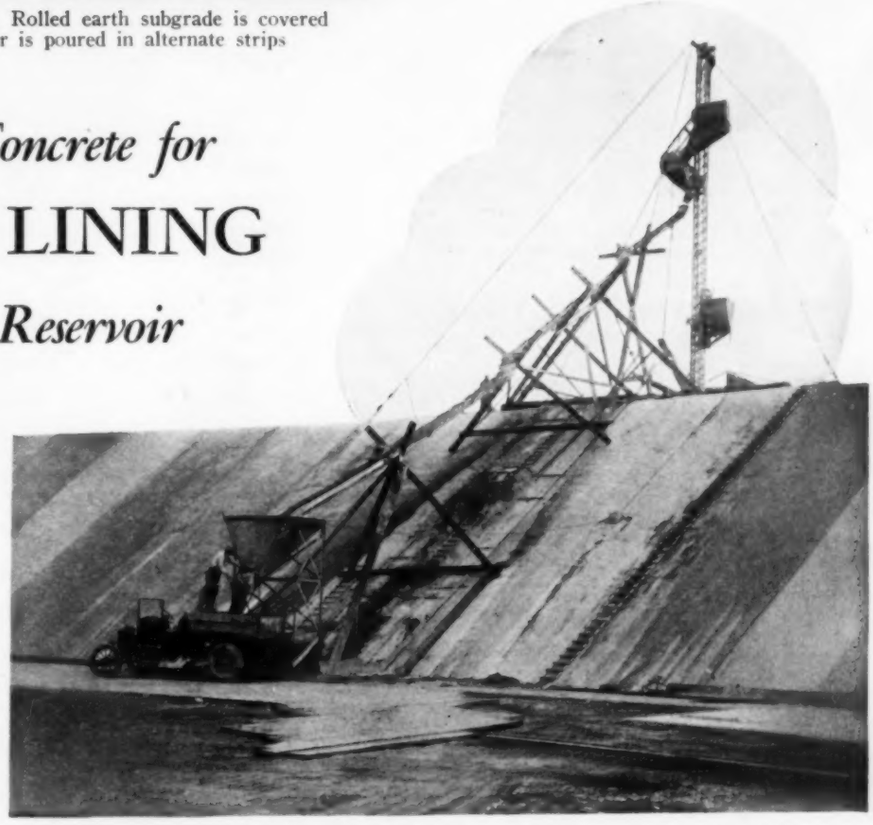
of California Oil Reservoir

MOTOR trucks provided an efficient and economical means of distributing concrete for a 12-acre concrete slab lining of a 2,250,000-bbl. oil reservoir which was recently constructed for the General Petroleum Co. of Los Angeles by the Robinson-Roberts Co., contractor of that city.

In deciding upon the equipment needed for such a job the question of service from the mixing plant brought out the fact that if concrete buggies were used, those delivering to the farthest points would have to make round trips of about a half mile. To obviate the loss in production which would inevitably follow the use of this method of distribution, the Robinson-Roberts Co. decided to employ motor trucks which worked out to advantage both as time and labor savers.

The reservoir is 750 ft. wide, 1,200 ft. long and 30 ft. deep. It is completely lined with concrete 3 in. thick, reinforced by a 6-in. wire mesh. The concrete on the slopes, which are on a 33 per cent grade, contains 7 sacks of cement per cubic yard and the floor concrete, 6 sacks per cubic yard. An admixture of 3 lb. of Celite to each sack of cement was used.

Mixer and chuting tower were located outside the reservoir. Concrete was chuted into the reservoir and loaded into the trucks for distribution.



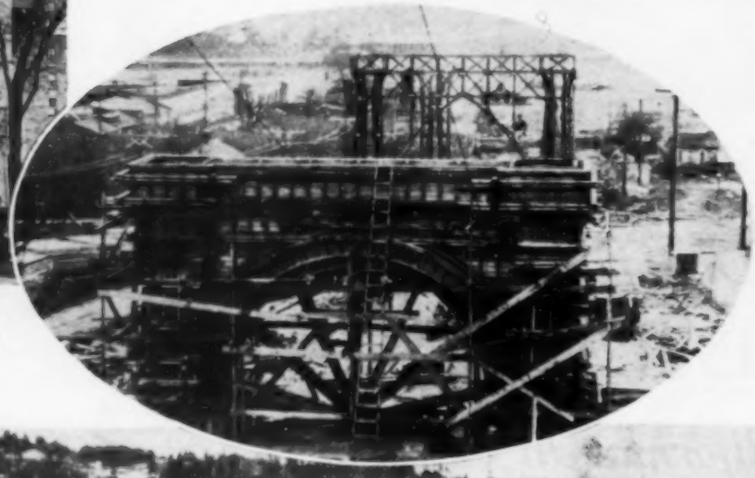
CHUTING PLANT located with mixer at outer edge of reservoir delivers concrete to trucks for distribution. Slopes are on a 33 per cent grade.

This Month's "News Reel"

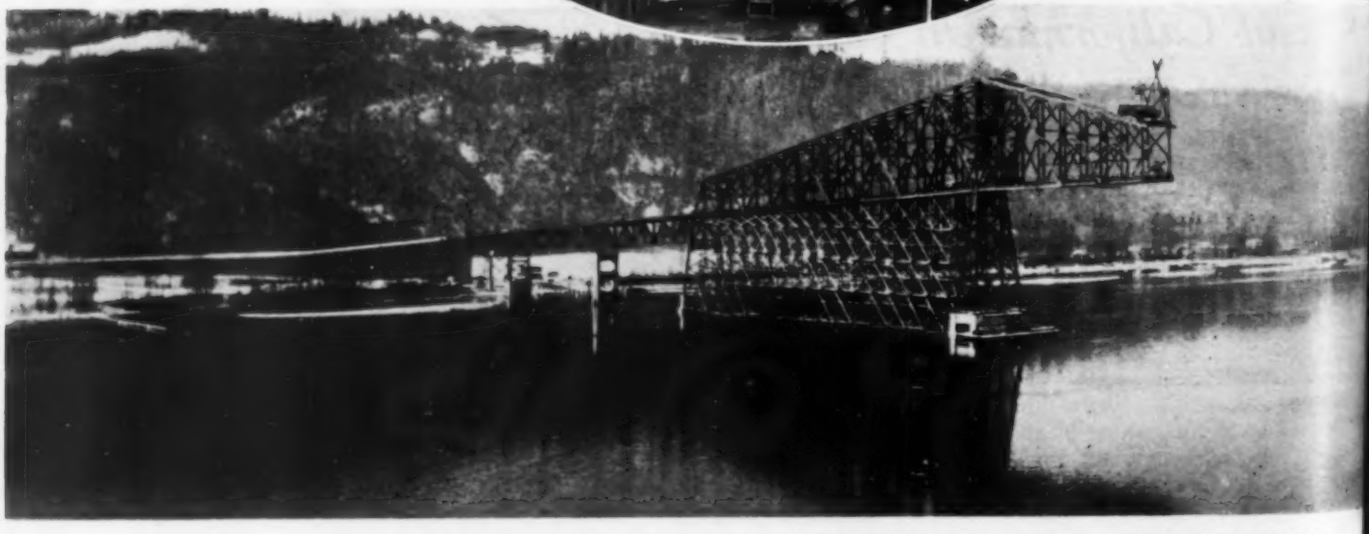
© P&A

STEEL SCAFFOLDING aids construction of new Riverside Baptist Church, New York, endowed by John D. Rockefeller.

CARPENTER HYDRO-ELECTRIC PLANT on Ouachita River, Arkansas, involving 115 ft. concrete dam, is second of three units for development of 200,000 hp. by Arkansas Power & Light Co., C. S. Lynch, chief engineer, and L. G. Warren, superintendent.



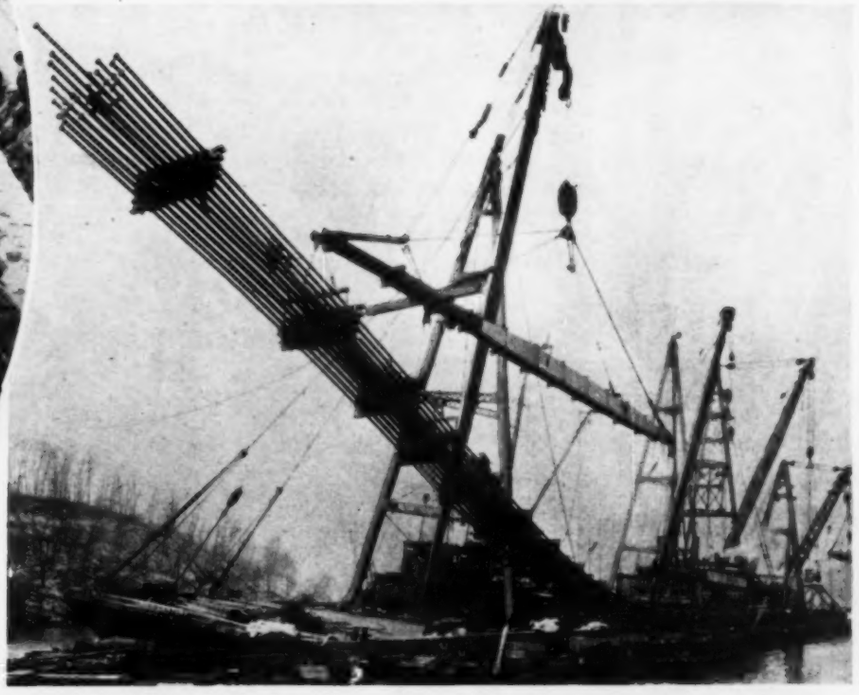
PIERS *(left)* for St. Johns suspension bridge, Portland Ore., Transit-mix concrete, distributed by steel towers and chutes, is used by Gilpin Construction Co., of Portland. J. F. Gilpin is superintendent and Otto Herman and C. W. Nash, assistant superintendents.



ACROSS COLUMBIA RIVER. Cantilevers of Longview interstate bridge, linking Washington and Oregon, ready for closure by 440-ft. suspended span. Length of structure and ap-

EXTERIOR DECORATION on new State Highway Building at Harrisburg, Pa., recognizes part played by men and machinery in road building. Plaques show tractor, roller and engineer survey party.

LUNCHEON IS SERVED on roadway of Coolidge dam, Arizona, after structure had been dedicated last month by ex-president (*in foreground*) whose name it bears.



SPECIAL FLOATING RIG was used by Merritt-Chapman & Scott Corp., to lay bank of thirty-six 4-in. electric conduit pipes, 660-ft. long, across Harlem River, New York.

proaches is 1¼ miles. General contractor, Bethlehem Steel Co.; substructure, Pacific Bridge Co.; approaches and floor deck, Lindstrom & Feigenson; steel erection, J. H. Pomeroy & Co.

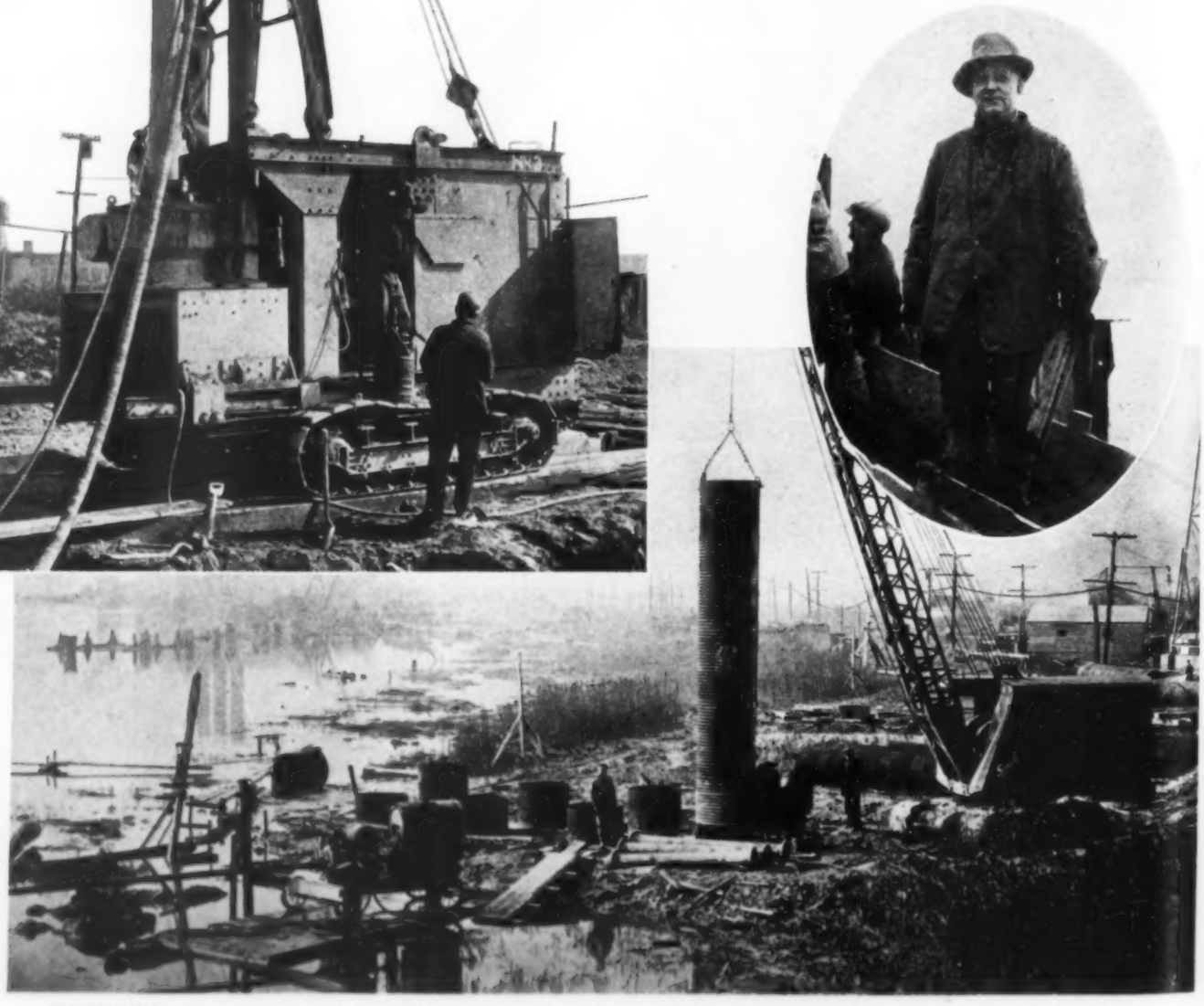
DEEP CAISSON CYLINDERS, Form "Stilts" to Support

Special Type of Substructure Employs 4-Ft. Corrugated Shell Sunk 80 Ft. Through Core of Soupy Mud and Filled With Concrete

TO SUPPORT eight concrete piers for the West Approach of the new passenger bridge which the Pennsylvania Railroad is constructing across the Hackensack River near Marion, N. J., Senior & Palmer, Inc., contractors, operating under the supervision of Charles Scott Landers of New York, retained as consulting engineer for the railroad, have employed a new form of small-diameter, concrete-filled caisson cylinder to reach a hardpan foundation at depths of from 73 to 83 ft. below high tide in the river alongside the job. The material at the site is a mixture of black mud, clay, sand and gravel.

Major Operations — Briefly, the method consists of five major oper-

FOR SINKING HOLES special rig has A-frame supporting hollow, rotating shafting through which water is fed to cutter-head



CYLINDERS of corrugated metal, 4 and 4½ ft. in diameter, made up of 22-ft. sections, are "jockeyed" down through mud-filled shaft to serve as casing. CHARLES SCOTT LANDERS, (*in oval*) consulting engineer, emerging from caisson air-lock

IN CLUSTERS, Piers of Bridge Approach

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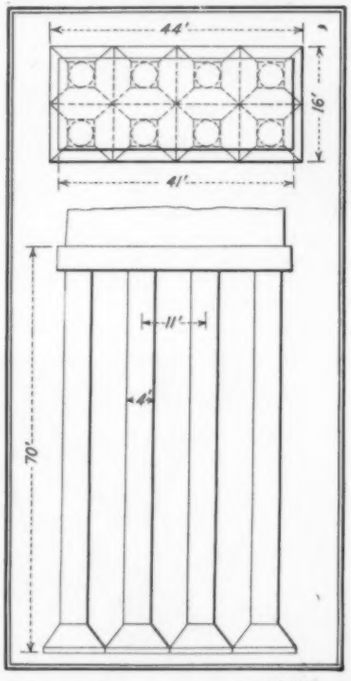
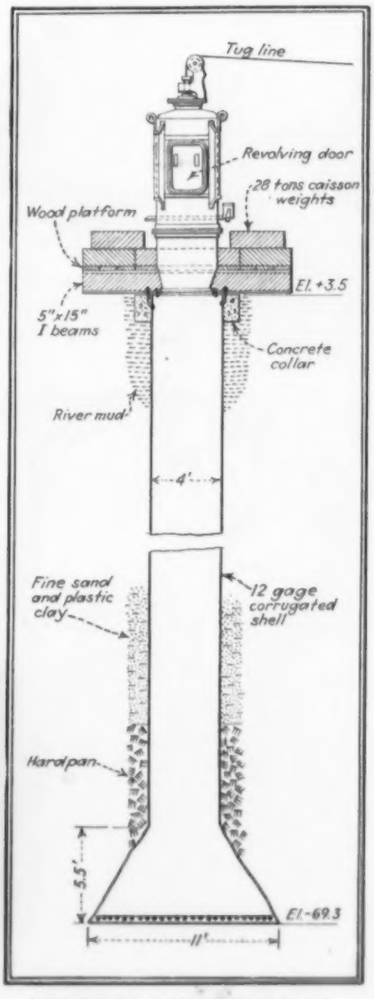


CONCRETING LOCK, superimposed on regular air-lock, passes material from hopper down into deep hole. (*In oval*) FRANK S. SENIOR, (*left*) member of firm, and J. F. ARMSTRONG, superintendent, Senior & Palmer, Inc., contractors of New York



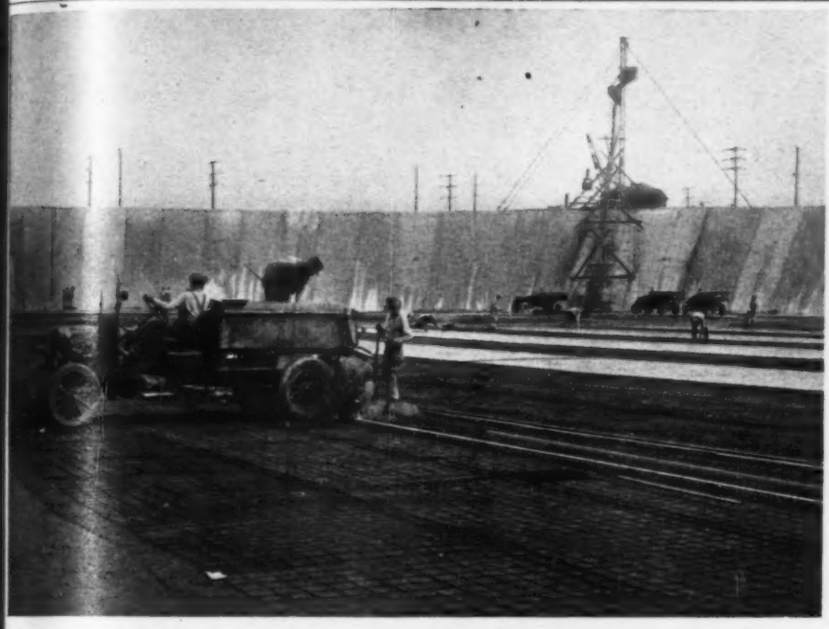
GENERAL SCHEME of caisson cylinder construction, with corrugated casing and air-lock in place, and footing belled out.

Construction Methods

A McGraw-Hill Publication—Established 1919

ROBERT K. TOMLIN, *Editor*

VOLUME 12 NEW YORK, APRIL, 1930 NUMBER 4



TRUCKS deliver concrete for floor slabs. Rolled earth subgrade is covered with 6-in. wire mesh reinforcing. Floor is poured in alternate strips

Trucks Distribute Concrete for

12-ACRE SLAB LINING

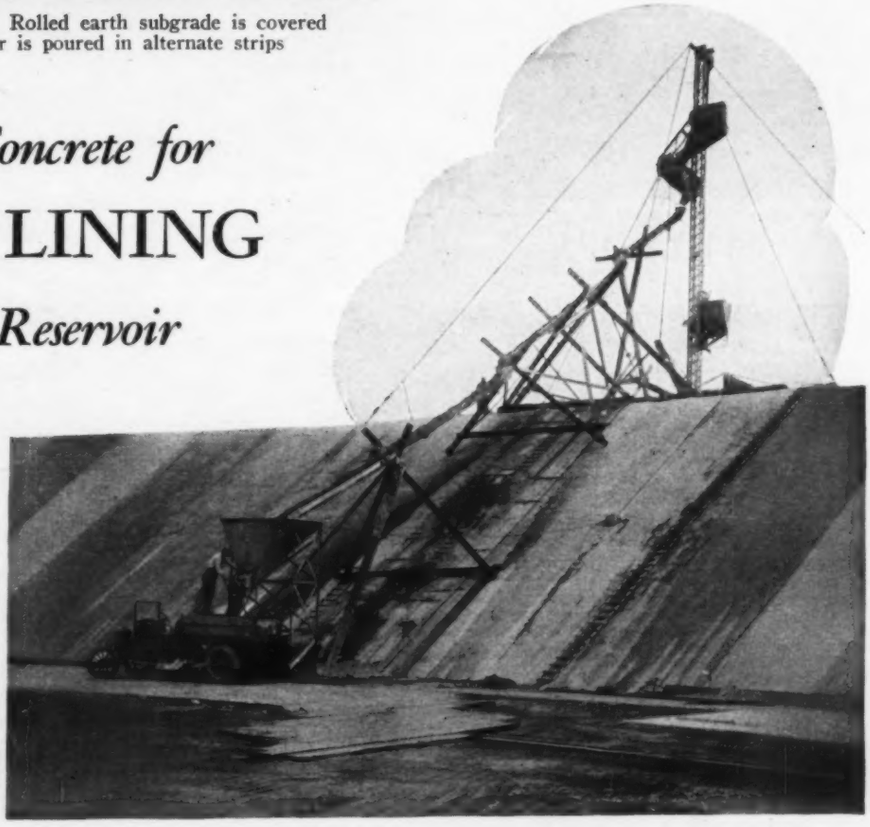
of California Oil Reservoir

MOTOR trucks provided an efficient and economical means of distributing concrete for a 12-acre concrete slab lining of a 2,250,000-bbl. oil reservoir which was recently constructed for the General Petroleum Co. of Los Angeles by the Robinson-Roberts Co., contractor of that city.

In deciding upon the equipment needed for such a job the question of service from the mixing plant brought out the fact that if concrete buggies were used, those delivering to the farthest points would have to make round trips of about a half mile. To obviate the loss in production which would inevitably follow the use of this method of distribution, the Robinson-Roberts Co. decided to employ motor trucks which worked out to advantage both as time and labor savers.

The reservoir is 750 ft. wide, 1,200 ft. long and 30 ft. deep. It is completely lined with concrete 3 in. thick, reinforced by a 6-in. wire mesh. The concrete on the slopes, which are on a 33 per cent grade, contains 7 sacks of cement per cubic yard and the floor concrete, 6 sacks per cubic yard. An admixture of 3 lb. of Celite to each sack of cement was used.

Mixer and chuting tower were located outside the reservoir. Concrete was chuted into the reservoir and loaded into the trucks for distribution.

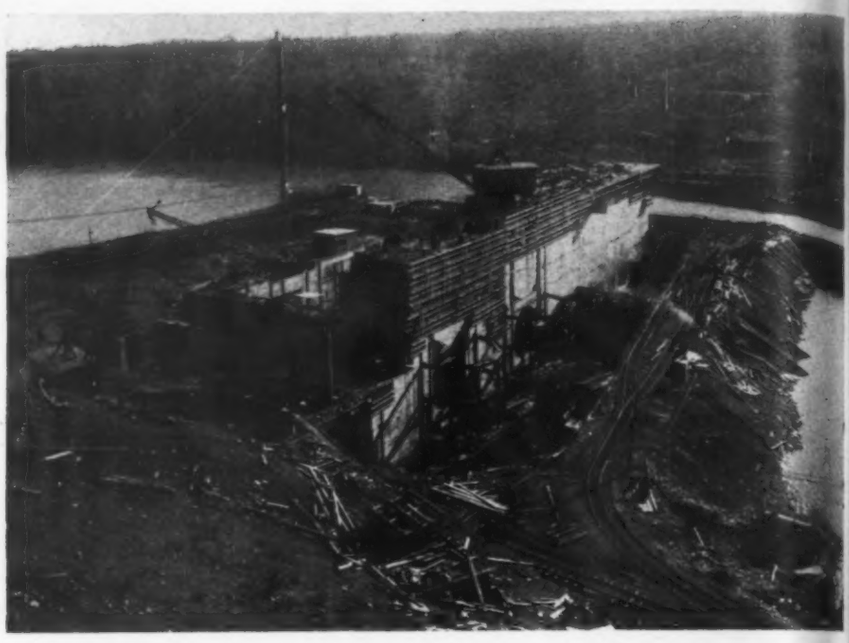


CHUTING PLANT located with mixer at outer edge of reservoir delivers concrete to trucks for distribution. Slopes are on a 33 per cent grade.

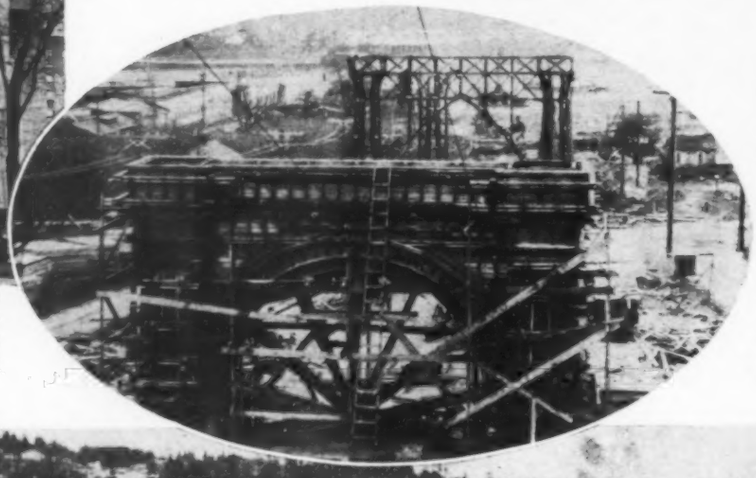
This Month's "News Reel"

©P&A

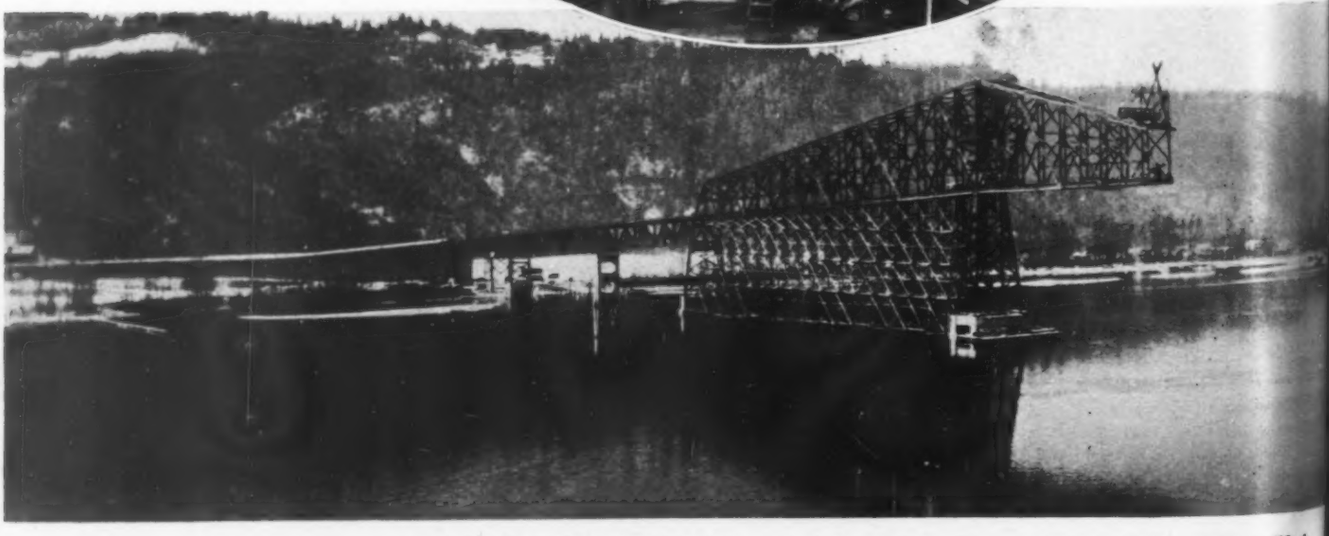
STEEL SCAFFOLDING aids construction of new Riverside Baptist Church, New York, endowed by John D. Rockefeller.



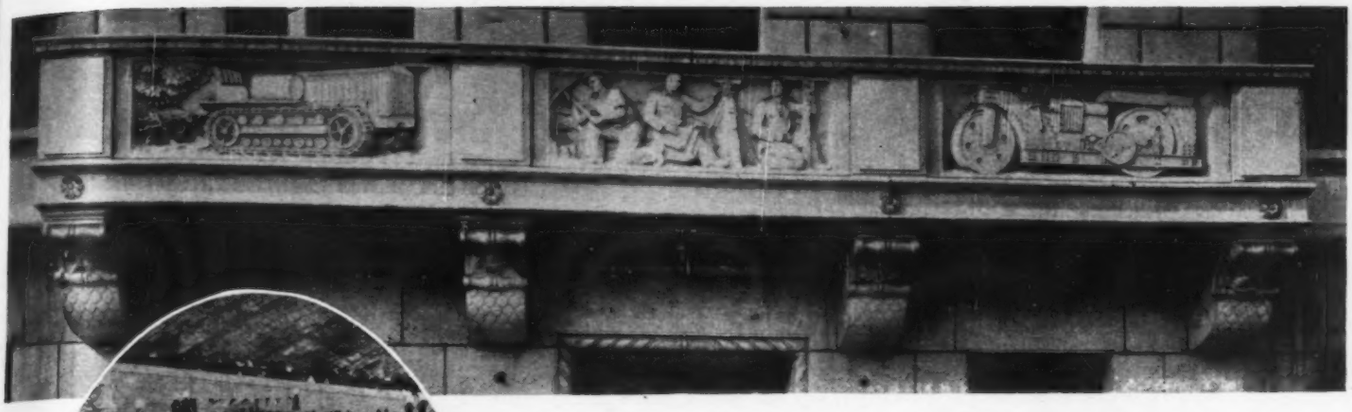
CARPENTER HYDRO-ELECTRIC PLANT on Ouachita River, Arkansas, involving 115 ft. concrete dam, is second of three units for development of 200,000 hp. by Arkansas Power & Light Co., C. S. Lynch, chief engineer, and L. G. Warren, superintendent.



PIERS *(left)* for St. Johns suspension bridge, Portland Ore., Transit-mix concrete, distributed by steel towers and chutes, is used by Gilpin Construction Co., of Portland. J. F. Gilpin is superintendent and Otto Herman and C. W. Nash, assistant superintendents.

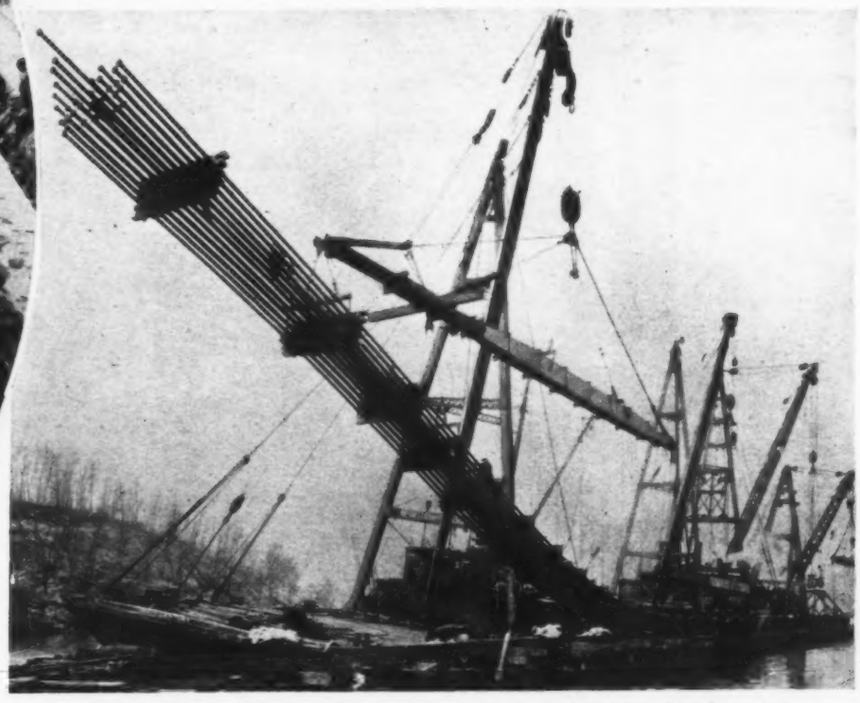


ACROSS COLUMBIA RIVER. Cantilevers of Longview interstate bridge, linking Washington and Oregon, ready for closure by 440-ft. suspended span. Length of structure and ap-



EXTERIOR DECORATION on new State Highway Building at Harrisburg, Pa., recognizes part played by men and machinery in road building. Plaques show tractor, roller and engineer survey party.

LUNCHEON IS SERVED on roadway of Coolidge dam, Arizona, after structure had been dedicated last month by ex-president (*in foreground*) whose name it bears.



SPECIAL FLOATING RIG was used by Merritt-Chapman & Scott Corp., to lay bank of thirty-six 4-in. electric conduit pipes, 660-ft. long, across Harlem River, New York.

proaches is 1½ miles. General contractor, Bethlehem Steel Co.; substructure, Pacific Bridge Co.; approaches and floor deck, Lindstrom & Feigenson; steel erection, J. H. Pomeroy & Co.

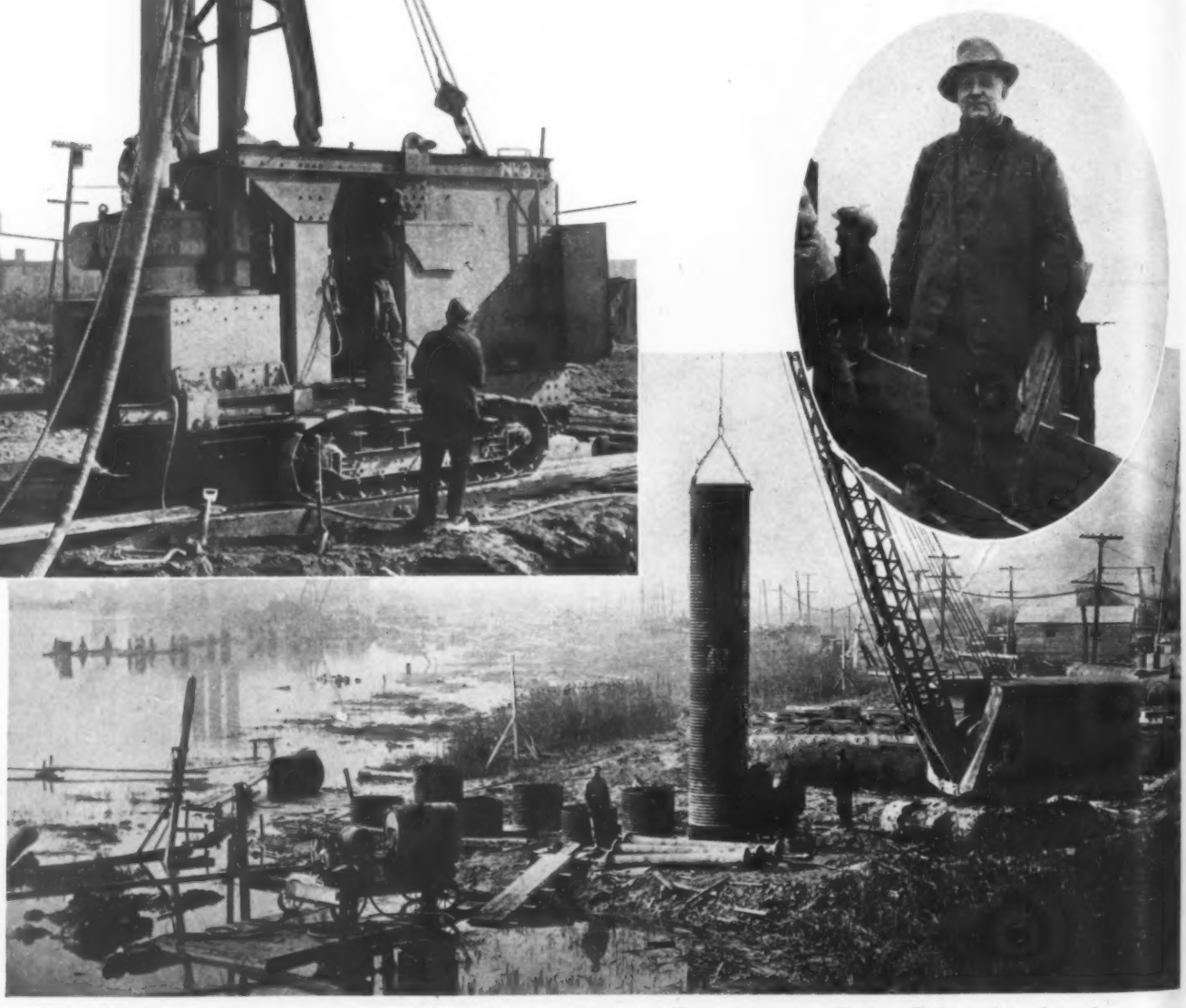
DEEP CAISSON CYLINDERS, Form "Stilts" to Support

Special Type of Substructure Employs 4-Ft. Corrugated Shell Sunk 80 Ft. Through Core of Soupy Mud and Filled With Concrete

TO SUPPORT eight concrete piers for the West Approach of the new passenger bridge which the Pennsylvania Railroad is constructing across the Hackensack River near Marion, N. J., Senior & Palmer, Inc., contractors, operating under the supervision of Charles Scott Landers of New York, retained as consulting engineer for the railroad, have employed a new form of small-diameter, concrete-filled caisson cylinder to reach a hardpan foundation at depths of from 73 to 83 ft. below high tide in the river alongside the job. The material at the site is a mixture of black mud, clay, sand and gravel.

Major Operations — Briefly, the method consists of five major oper-

FOR SINKING HOLES special rig has A-frame supporting hollow, rotating shafting through which water is fed to cutter-head



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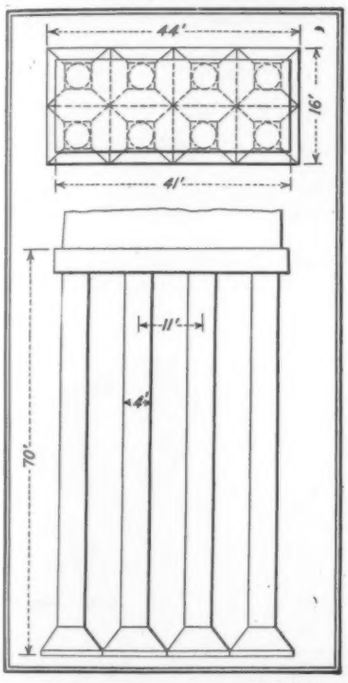

CASING, with air-lock removed, ready for concreting

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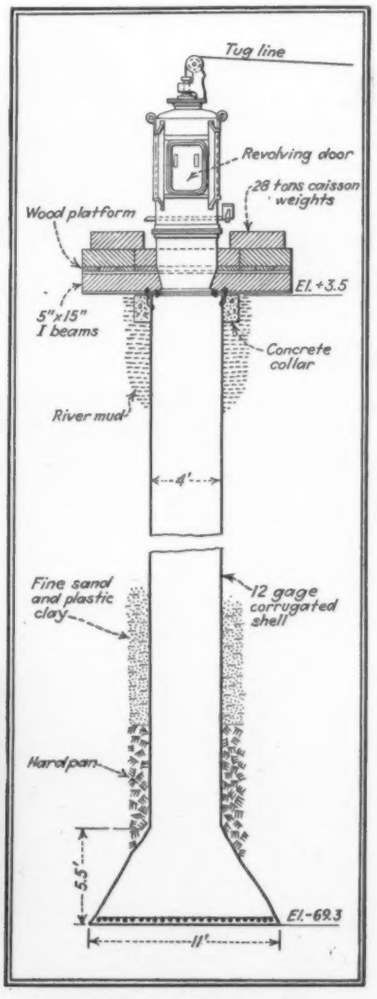


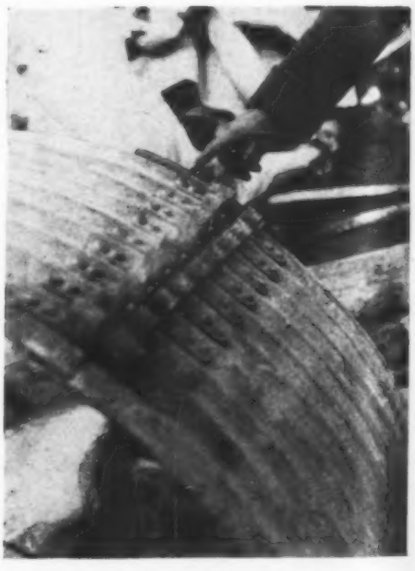
GENERAL SCHEME of caisson cylinder construction, with corrugated casing and air-lock in place, and footing belled out.

organization, is the loosening and softening, by means of a "whirligig," of a long vertical core of material through which the corrugated pipe casing is later sunk to grade. None of this soft mud core, however, is removed until after the casing is seated on hardpan. Instead, the liquid mud remains in the hole, supporting its sides while the casing is sunk.

Cutter Head—For coring out the hole the contractors use a special crawler-mounted, gasoline-powered rig equipped with a hinged A-frame mast from which is hung a line of hollow, vertical shafting (in the form of flanged pipe sections) carrying at its lower end a rotary steel cutter-head. The shafting is keyed to a rotating element on the front end of the rig, as shown in the photograph below. While the shafting revolves, water is fed through it to points of discharge in the cutter-head.

SWIVEL JOINT, with ball bearings, carries rotating hollow shafting for cutter-head

MUD BUCKET for cleaning out shafts is steel cylinder with flap valve in bottom



BELLYBAND, with line of bolts, joins successive 20-ft. lengths of corrugated casing

CUTTER-HEAD for forming deep holes is rotated by hollow shafting (*in oval*) through which water is fed to form soupy mud

The cutter has a spear-shaped head and horizontal arms or wings welded to its body. On these arms are bolted steel teeth or cutting-edges. Heads with two and with three of these cutting arms were used. The body of the head is hollow and has holes to carry water under pressure to its point. It is important to realize that this operation is *not* one of excavation, inasmuch as no material is removed from the hole except for some of the heavy liquid mud which flows away from the top of the hole into a sump. Instead, there is created down to grade a deep, circular well filled with semi-liquid mud which prevents its sides from caving in. During the descent

of the cutter-head an important detail is the feeding of just enough water to soften the material, but not enough to wash it out.

Corrugated Casing—When a hole reaches grade on the hardpan the cutter-head and hollow shafting are removed and casing of 22-ft. lengths of No. 12 gage corrugated metal pipe, joined by bolted straps or bellybands 24 in. wide, is picked up by crawler cranes and jockeyed down through the soft mud core. An extra 24-in. band of metal is fitted to the bottom of the first section of casing to serve as a cutting-edge.

Then, and not till then, is removal of material from within the shell begun. The upper portion of the core, to a depth of 30 to 40 ft., is taken out with a 1-yd. cylindrical bucket with a flap valve and a small Hayward orange-peel bucket. Then a concrete collar 24 in. thick is cast around the top of the casing and a 1-in. steel adapter plate is installed to connect the shaft and an air-lock. The remainder of the mud core is removed by hand excavation with short-handled picks and shovels.

After the joints of the corrugated shell have been calked, compressed-air workers descend to the bottom of the casing in relays and "bell out" with pneumatic spades to the bottom of the shaft for an additional depth of about 5½ ft. to provide a circular bearing area 11 to 12 ft. in diameter for each cylinder on the hardpan. During this operation an air pressure up to 32-lb. per square inch is maintained. The compressor plant, comprising diesel-powered main units and gasoline powered auxiliaries, has a total output of about 4,600 cu.ft. of free air per minute. Of this capacity, 3,500 cu.ft. is for the caissons and 1,100 cu.ft., at high pressure, for operating pneumatic spaders, chipping hammers and other compressed-air tools.

BOTTOM-DUMP BUCKETS deliver concrete for upper portion of caisson cylinder filling.

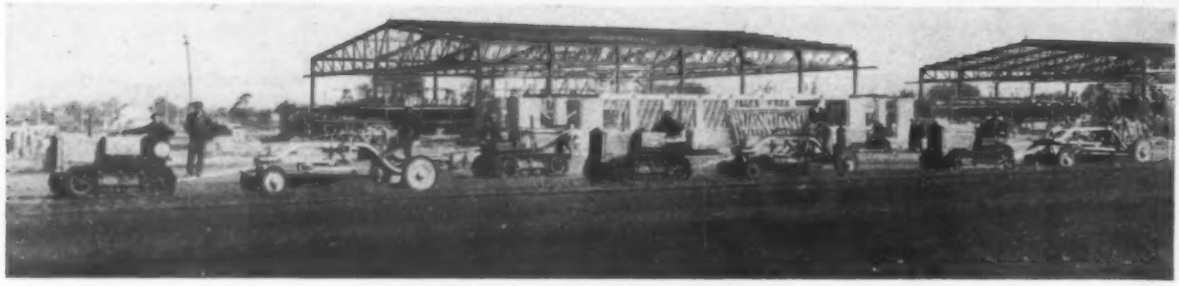
Concreting and steel bar reinforcement is next placed within the corrugated pipe shell, a lock with concrete hopper and gates is superimposed on the regular locks and the caisson cylinder is filled with concrete dropped down into the hole through the lock. Concreting under air pressure is continued to a point within about 40 ft. of the top of the cylinder. The air-lock is then quickly removed, 30 ft. of steel reinforcement is placed and the concreting continued to the surface of the ground, making a monolithic cylinder reinforced throughout.

The final operation consists in capping the clusters of deep cylinders with a heavy reinforced concrete block 48 in. thick. The substructure is then ready to receive the masonry for the piers.

Experience on the work indicates that 4½ rather than 4 ft. is the preferable diameter for the casing, as it allows a little more working space for handling the lower portion of the excavation and the placing of the reinforcing steel. Other important details of construction are the necessity for accurately plumbing the leads guiding the cutter-head in its descent. Great care must be exercised, too, in admitting to the cutter-head exactly the right amount of water so as not to wash material out of the hole and cause the collapse of its side walls.

Personnel—For the Pennsylvania Railroad on the Hackensack River bridge work T. J. Skillman is chief engineer, T. W. Pinard, engineer of bridges and buildings, A. C. Watson, engineer in charge of the New York zone, and J. J. Vail, construction engineer. Charles Scott Landers, of New York, specialist on deep foundations and compressed-air work, is consultant to the railroad. For Senior & Palmer, Inc., the contractors, J. F. Armstrong is superintendent.

AIR-LOCKS, with revolving type of door, are installed after corrugated casing has been sunk to grade through mud-filled vertical hole



STRUCTURAL WORK for the builder and grading for the highway contractor.

Separate Contracts Recommended for

AIRPORT CONSTRUCTION

Division of Work Into Two Major Groups of Items for Highway and Building Contractors Would Yield Better Bids

By R. P. BAYARD

Vice-President, Johnson, Drake & Piper, Freeport, N. Y.

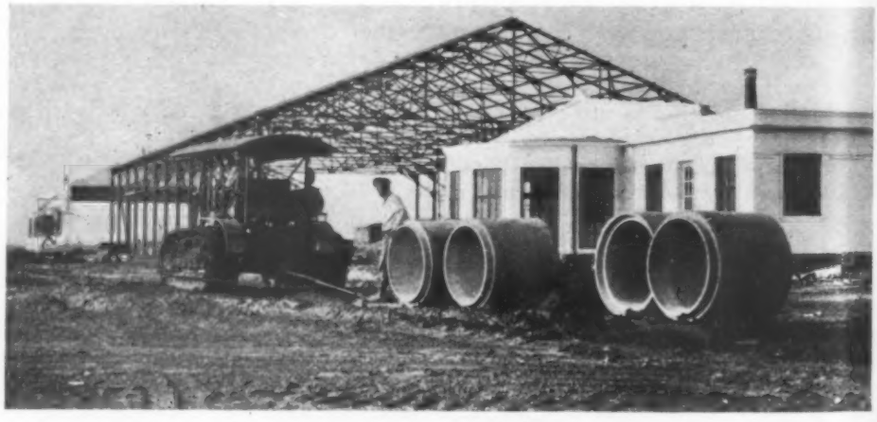
AIRPORT construction is of direct interest to highway contractors in proportion to the amount of money being spent on this type of work and the contractor's ability to handle it without great expenditure for additional or special equipment. Tremendous sums of money are being spent for airports and will continue to be spent in equal or larger measure during the next few years.

In determining the cheapest and best way to construct airports and landing fields owners and engineers should consider the class of contractors who can compete for and handle their work most economically and efficiently. The result of such study has raised the question of the advantages of letting the work for greatest economy and speed to one general contractor, in which case the bidding is limited to a few large concerns who have developed departments covering all branches of airport construction, or dividing the work into two or more contracts which can be let at the same time and progress simultaneously, but with the resultant splitting of responsibility for the completed unit. The results of several recent airport lettings has indicated that both the highway and the building contractors are at a disadvantage in bidding when the complete airport is let as a unit, each being dependent upon the other for sub-bids on a large portion of the work.

Modern airport construction consists of the following principal items, which are here classified as being logically adapted either to highway contractors or building contractors.

Highway Items—The highway contractor's group of items is:

(1) Clearing and grubbing. (2) Excavation, including the general leveling and grading of the area and including dredged fill or imported fill and excavation for all structures other than buildings. (3) Drainage, including storm and sanitary sewer and drain tiling. (4) Surfacing of runways. (5) Surfacing of landing areas. (6) Surfacing of hangar aprons and automobile highways. (7) Miscellaneous structures, such as pedestrian subways, guide rail and fences. (8) Topsoil for field to be turfed. (9) Automobile parking areas. (10) Shoulders.



DRAINAGE and other structures are called for in contracts for airport construction.

Building Items—The building contractor's items are:

(1) Hangars, including sliding doors, floors, heating, plumbing, lighting, and shops. (2) Administration building. (3) Recreational buildings complete. (4) Hotel and club rooms and schools. (5) Grandstand, gateways and pedestrian runways. (6) Service stations, railroad and bus terminal buildings and accessory factory buildings, comfort stations.

In addition there are other items which can generally be let separately to advantage, because of their special nature or because of the length of time required to complete the work. Of these items the principal ones are:

(1) Field lighting for AIA fields, which are equipped for night flying. (2) Turf building. (3) Furnishings and equipment for all buildings.

Shrewd owners and engineers should divide their work into two or more contracts, because there are few general contractors qualified to handle all phases of modern airport work. Assuming that the owner does not divide his work, as suggested, let us consider the items which naturally fall within the sphere of the highway contractor.

First, there is clearing and grubbing, which is a major item. It is generally a cut-and-fill proposition, although sometimes a hydraulic fill or imported fill is required for airports built on cheap lowlands.

After the topsoil, if any, has been stripped and stockpiled, and after the heavy cuts and fills are placed and rolled, considerable effort is required to true the surface of the entire area, removing all local ridges and bumps and eliminating all grades over 2 per cent. This leveling is generally done with tractors, blades and heavy drags. Any of this grading, except dredge

work, could be done with the ordinary highway grading equipment and organizations. Shovels, trucks, elevating graders, tractors, blades, scrapers, automatic fresnoes and light railway are generally used.

Drainage is one of the most important features in the construction of the airport and landing field and might involve some organization and equipment which the average highway contractor does not have. Generally, however, he can handle it to pretty fair advantage. A landing field should not be overdrained unless the entire field is to be surfaced with some treatment permitting a plane to take off in any direction. Such a field is called an "all-way field." Moisture is necessary for the building of good turf, one of the greatest features of a good field.

The next highway contractor's item is the proper surfacing of runways. There seem to be points in favor of both concrete runways and the various bituminous and other types, but regardless of the type, this item naturally falls in the strictly highway contractor's group.

Next comes the surfacing of landing areas. If the field is to be turfed the preparation of the area for seeding or sodding can be done to advantage by the highway contractor, but the development of a good turf takes from four to eight months or longer, and should be done by the airport maintenance forces. Where the traffic is heavy, or for other reasons a turf landing is not planned, an "all-way field" is often constructed with the entire surface of the field treated with a bituminous material. All of the various bituminous types of surfacing as well as the concrete pavement used on a few large fields, are within the scope of the highway contractor.

Surfacing of aprons in front of and between the hangars is now almost universally done with concrete pavement, as are the highways around and entering the airport. This work is certainly strictly within the field of the highway contractor.

Among "miscellaneous structures" are always a few retaining walls, ramps, open gutters, curb, sidewalks, pedestrian bridges and pedestrian underpasses, guide rail, gateways and property fences, as well as automobile underpasses. With all this work the highway contractor is familiar.

The next item is topsoiling. When a turf landing area is planned, it is generally necessary to import and spread a good grade of loam or topsoil to support the grass, although often this material can be stripped from the original top surface before excavation or filling commences, stockpiled and replaced after the grading is completed. All of this work is within the field of the highway contractor.

Automobile parking areas are necessary to accommodate the huge crowds which gather at the airports, especially on Sundays and holidays. They generally involve only grading and a light bituminous earth treatment or a macadam, gravel or cinder surfacing. In some of the major airports, however, there is a tendency to build everything possible on a permanent basis and there we find parking fields being built of 4- or 5-in. plain or reinforced concrete pavement or with one of the standard bituminous type pavements. The construction of these automobile parking areas is certainly a highway contractor's job.

Listed last is "shoulders." After the wide take-off runways have been paved with concrete, bituminous macadam, asphaltic concrete or whatever type is selected and the tile drain installed along the edges of the runways, the shoulders must be constructed, bringing the surface of the areas adjacent to the runways level with the runways, so that planes can take off or land across the runways, if necessary.

Division of Contracts—If the work of airport construction is divided approximately, as above suggested, so as to appeal to highway contractors who would not care to bid on a general contract for an entire airport and also to building contractors in a like position, it is believed that much better bids could be obtained by the owner. There are now a few contractors in the country who have developed departments handling every phase of airport construction and who are thoroughly capable of handling the work in its entirety with the resultant centralized responsibility, but, generally speaking, better results at this time are obtainable by dividing the work into two or three major contracts, as there are too few of these companies equipped to handle the entire construction of a modern airport with their own forces and equipment.

Most of the contracts for the construction of airports in this country, both private or municipal, are being let on a competitive bid basis, rather than on the fee or cost plus basis. The work, therefore, can be divided so as to appeal to already existing groups of contractors capable of handling the construction and is capable of reduction to familiar unit items for bidding purposes. Also, it is far easier for the engineer to keep within his appropriation by this means of handling the work. There is between $150,000,000 and $200,000,000 worth of work to be let during 1930 all over the country, all of which the highway contractor can handle to advantage.

EARTH HANDLING is a big item in all airport work and one which the highway contractor is peculiarly qualified to handle.

Paper, slightly condensed, presented Jan. 14 before the Contractors' Session of annual convention of American Road Builders' Association at Atlantic City, N. J.

Compact Organization Makes
Through New York Suburban

HIGH PRESSURE

THE construction of a gas pipe line passing through various suburban towns presents numerous and perplexing problems to a gas company. Permits must be obtained and penalties are imposed if crossings or driveways are closed to traffic longer than the time allowed. Unless the work is handled efficiently an unfavorable reaction may be felt in the relations between the gas company and the communities.

With these problems in mind E. L. Phillips & Co., of New York City, on a recent Long Island gas development involving the construction of a 79,000-ft. oxwelded high-pressure transmission line of 12-in. pipe, built up an organization capable of handling the work with a minimum of public inconvenience and traffic interference. Under the direction of C. M. Hendry 800 ft. of pipe line was completed each day.

SPACING PIPE ENDS with ¼-in. welding rod. Each group consists of five 40-ft. lengths of 12-in. pipe.

Pipe in 40-ft. lengths, beveled at each end for field welding, was delivered by the National Tube Co. at convenient sidings and distributed along the route by motor trucks equipped with A-frame derricks.

The line-up gang placed the pipe supported on wooden skids in groups of five lengths each and ¼-in. apart. An operator, using a portable welding outfit, made four tack welds at each joint so that the five lengths could be moved as a unit during the main welding operation.

Oxygen and acetylene for line welding were

OXYACETYLENE BLOW PIPE is held in usual way, pointing in direction of advancing weld. Pipe is turned with tongs as welding progresses.

WELDED OFFSET BENDS are fabricated near the point of installation with oxyacetylene outfits mounted on portable trucks.

TIE-IN WELDS joining groups of pipe are made by welder using portable outfit which gives mobility necessary for alternating between tack-welding and tie-ins.

PROTECTIVE COAT OF ENAMEL *(left)* is placed on pipe by three men, one of whom pours the hot enamel while the other two walk along slowly holding a canvas sling for the banding operation. KETTLE *(below)* for heating enamel is tended by man who also fills cans of carriers.

Steady Progress in Construction
Towns of 79,000-Ft. Welded

GAS PIPE LINE

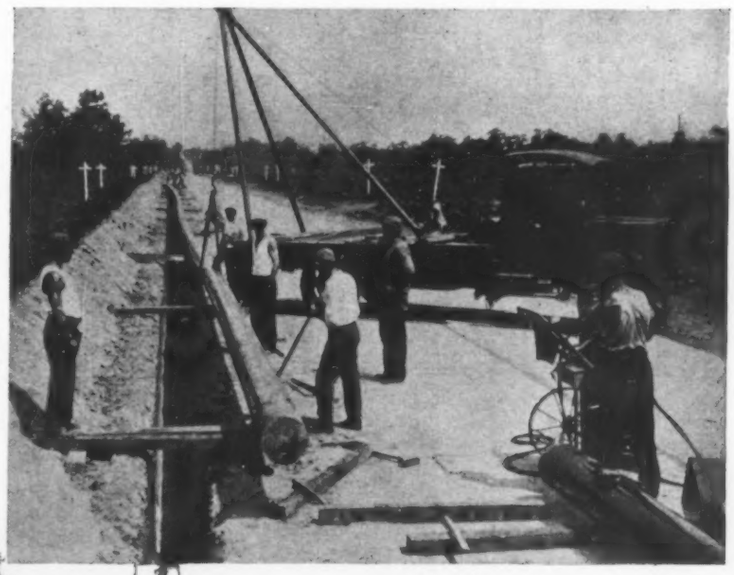
supplied from a "gas wagon" — a Ford truck from which the motor had been removed and on which necessary equipment was mounted—and distributed to the welders through two small-diameter lines 200 ft. in length.

The 200-ft. welded pipe lengths were welded together in 400, 600 and 800-ft. sections, the tie-in welds being made with a portable outfit. A priming coat then was given the pipe and after 24 to 36 hours hot enamel was applied using a canvas sling.

In the meantime the ditching crew prepared the trench. A Barber-Greene ditcher handled most of the excavation, but the crews were provided with tools for breaking up concrete and doing other necessary hand work.

As the ditch was completed, four 4x4-in. skids were placed over it every 100 ft. A derrick truck lifted the pipe sections on to the skids and raised the pipe high enough to permit the removal of the skids when necessary. Enamel coating was replaced where it was injured. Expansion joints were used to join the sections lowered into the trench so that few bell-hole welds had to be made. Special bends and fittings required at many points were handled by welders equipped with outfits on portable trucks.

Backfilling was done by a Parsons machine as soon as the line was lowered, leaving each joint exposed for test which was made by blocking off a sufficient length and applying air pressure of 100 lb. per square inch, about twice the designed working pressure of 45 lb. per square inch.



SKIDS carry pipe over trench for lowering at proper time by A-frame derrick mounted on motor truck.

BACKFILLING of trench is handled by a Parsons machine. Joints in pipe are left exposed and covered later when pressure tests are made.

Drills and Dynamite

Open Up Rock Cut for Boulevard Approach to Hudson River Bridge at Fort Lee, N. J.

A BATTERY of cranes, shovels, trucks, tractors and pneumatic tools has been been assembled by the Clinton Asphalt Co., general contractors of Union City, N. J., to carry out an extensive street improvement program inaugurated by the town of Fort Lee, N. J., in preparation for the increase in population expected to follow the completion of the new Hudson River Bridge in 1932.

Fort Lee's ambitious schedule, under the direction of Charles Schossman and A. L. Willgoose, engineers, will cost $1,500,000 and involves the removal of 80,000 cu.yd. of rock and 14,000 cu.yd. of unclassified spoil; the construction of 4 miles of sewers ranging in size from 6 to 21 in.; 672,000 sq.ft. of concrete and asphalt paving; 164,000 sq.ft. of concrete sidewalk, and 8 miles of concrete curb.

The general street improvement plan comprises four north and south boulevards and eight east and west cross streets which will average 2,000 ft. in length. Abbott Boulevard, the main street, and the first in which work has been started, will follow the right-of-way of the Public Service trolley tracks.

Most of the territory is hard trap-rock with an average overburden of 3 ft., necessitating the employment not only of material handling machinery, but also of drills and dynamite for loosening the spoil. The procedure on

CRANE mounted on truck loads spoil into trucks which carry it to existing depressions where it is dumped and leveled to grade by tractors equipped with bulldozers.

PNEUMATIC DRILLS prepare holes for blasting. Drill steels must be changed every 16 in. because of hardness of rock. Log blankets are used when dynamite charges are set off.

DRILLING FOR SEWER TRENCHES *(above and right)* Portable air compressors, 24 in number, supply air for pneumatic tools. Sewers range from 6 to 21 in. in diameter.

Abbott Boulevard is typical of the general construction plan which is being carried out for the Clinton Asphalt Co. by J. P. Murphy, superintendent.

Four Osgood steam shovels remove the overburden on each side of the trolley tracks and are followed closely by the rock drilling crews operating Ingersoll-Rand S-49 "Jackhamers." The drill holes are spaced 2 ft. apart and driven 1 ft. below grade, the drills being changed every 16 in. Three blacksmith shops equipped with Ingersoll-Rand No. 33 sharpeners assure a supply of well sharpened steel at all times.

For each hole more than 6-ft. depth, four sticks of Dupont 60 per cent dynamite are used. Two sticks are placed in the bottom of the hole, one stick half way to the top and the fourth three-quarters up from the bottom. The intervening spaces are tamped with sand. This method of drilling and blasting obviates re-drilling of the rock.

Spoil is loaded into 5- and 7-ton trucks by four Link-Belt cranes equipped with 1-yd. buckets and carried to existing depressions where it is unloaded and leveled to grade by Caterpillar tractors equipped with La Plant-Choate bulldozers.

As the rough grading proceeds, the sewers are drilled, the spoil removed and part of the overburden placed in the trench by cranes to form a cushion for the sewer mains. Vitrified sewer pipe then is laid, the joints being sealed with hot asphalt. The trench is finally covered with the remainder of the overburden.

When blasting and loading for two street intersections have been completed, one-half of the Boulevard is closed to trucks and the concrete subbase is laid, a Multifoote 27-E paver mixing the 1:3:5 concrete. Curbs and sidewalks are laid at the same time. Aggregate and sand are delivered in 7-ton batch trucks which back up to the paver delivering one batch at a time. Cement is added to each batch as it is dumped from the trucks. Water for the mixer is obtained from hydrants about 600 ft. distant. When the concrete is set, trucks are diverted over the completed sub-base and the other half is paved.

Air for the pneumatic tools is furnished by 24 Ingersoll-Rand portable air compressors. Additional loading equipment consists of 5 Erie gas shovels, 3 Keystone shovels, 2 Link-Belt clamshells, 2 Austin cranes, 8 Universal cranes, 3 Thew gas shovels, 2 Browning shovels mounted on Mack trucks and 2 Osgood cranes.

Fifth of a series of articles on the $325,000,000 construction program for flood control in the Mississippi Valley

The Defense Against OLD MAN RIVER-V

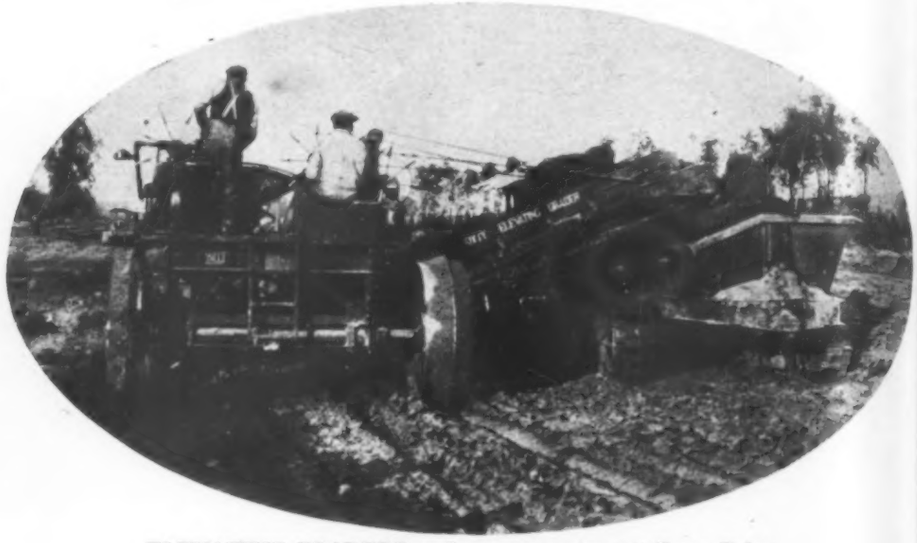
By ROBERT K. TOMLIN
Editor of *Construction Methods*

Levee Building With Tractor-Wagon Outfits

TRACTOR-HAULED wagons, loaded either by elevating graders or small crawler-mounted draglines, are among the types of equipment widely used for levee construction along the Mississippi River. On the ten-year, $325,000,000 program of flood control which is proceeding under the direction of the Corps of Engineers, U. S. Army, the tractor-wagon outfit has been developed to a high degree of efficiency and is in evidence at numerous locations in the Memphis and Vicksburg districts. While this method of earth moving is an evolution of the mule-team and scraper practice of early levee-building days, it is a far cry from today's well-co-ordinated, powerful mechanical equipment to the crude hand-labor operations and animal haulage of the past.

The size and character of the levee-

V. A. LONG, of Lowrance Bros., contractors for Pecan Point levee.



ELEVATING GRADERS on Lowrance contract at Pecan Point, Ark., load 7-yd. bottom-dump crawler wagons.

HYDRAULIC DUMP DEVICE enables tractor operator to empty wagons, eliminating extra man needed on hand-operated mechanism.

POWER TAKE-OFF from tractor provides independent drive for belt of elevating grader, doubling capacity.

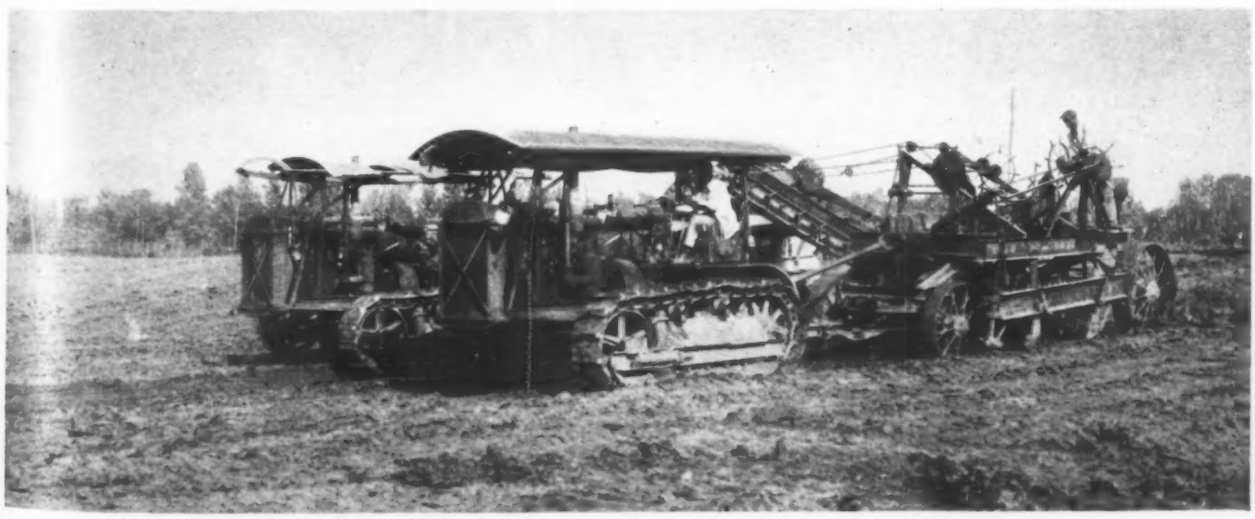
MULES supplement mechanical haulage when they are not needed for work on nearby cotton plantation owned by Lowrance Brothers.

building and enlargement job to be done under the present program has stimulated radical developments in the plant now available for the levee builder's use. An impressive indication of the changed conditions is contained in the latest report of the Mississippi River Commission. "When active levee work began in 1882," says the report, "the levees of the Yazoo Basin were 8 ft. high and contained about 31,500 cu.yd. per mile; today the levees in the same district average 22 ft. in height and contain about 421,000 cu.yd. per mile. When raised to the 1928 project grade and section the levees will average 26 ft. in height and will contain 678,000 cu.yd. per mile."

Equipment Mechanized—With these huge earth yardages to be handled the passing of the wheelbarrow, the drag or wheel scraper, and the mule-drawn dump wagon was inevitable. In their place we now find, in addition to the big draglines and tower cableway machines, completely mechanized hauling outfits comprising gasoline-powered tractors and crawler-mounted dump-wagons for the transport of earth from borrow pit to levee section and either elevating graders with improved loading devices or small mobile draglines for the excavating and loading operations. This month's installment of the Mississippi River articles illustrates and describes several typical tractor-wagon levee-building contracts.

Most of the Mississippi flood control construction now in program, as pointed out in a previous article, is enlargement of existing levee sections rather than new construction. Across Pecan Point, Ark., however, an example of the latter type of work is found in the new loop or set-back levee which Lowrance Bros. & Co., of Driver, Ark. (with E. A. Polk and S. L. Hunter as sub-contractors) are constructing with tractor-hauled wagons loaded by elevating graders. Here, where a chute in the river forms a U-shaped bend around a neck of land, the existing levee is being abandoned and a new embankment some distance inland from the old one is being extended across the point. For the contractor V. B. Long and Frank Stanford supervise the field operations. The material is a mixture of loam, sand and clay, calling for the standard B section of levee with 10-ft. crown width, riverside slope of $3\frac{1}{2}$ to 1 and landside slope of 6 to 1.

Pecan Point Levee—The contract is in three sections involving a total of 974,000 cu.yd. (net section) at a price of 24.65 cents per cubic yard. For the tractor-wagon method of construction used the specifications require the placing of 15 per cent excess yardage to compensate for shrinkage and settlement of the completed levee. The length of the job is slightly more than 2 miles and the average height of the levee about 20 ft. At certain points



CATERPILLAR TRACTORS of 60 hp. work 20 hours per day hauling elevating graders and crawler wagons on Pecan Point Levee.

LOADING is aided by cutting down one side of wagon body to accommodate carrier belt of graders.

TRACTOR OPERATOR, without leaving his seat, can dump this wagon by means of hydraulic device.

on the line cypress brakes were encountered, necessitating the removal of large stumps, as shown in the illustration at the top of p. 48.

The Lowrance organization and its sub-contractors have made an extensive outlay in mobile equipment on this work, including 24 Caterpillar tractors, 9 Russell elevating graders and a fleet of 7-yd. crawler-mounted wagons of several types, including LaPlant-Choate, Smith, and Streich models. In addition to the tractor-hauled units there are four-wheeled Western 1-yd. bottom-dump wagons hauled by four-up mule teams. In explanation of the animal haulage on this contract the Lowrance brothers operate an extensive cotton plantation near Pecan Point from which mules are temporarily transferred to the levee work from August to January when they would otherwise be idle. At the time the job was visited 225 of these mules were hauling earth for the levee. During the loading of the wagons by the elevating graders the mule-drawn units take their place with the tractor outfits in the constantly moving line. In delivering material to the levee, however, the mule wagons usually dump in the lower portion of the section, leaving the longer and steeper grades to the top for the tractors with their crawler wagons.

FIVE-YARD WAGONS are hauled in pairs by single tractor on Aderholdt job. Borrow pit and dragline loader in background.

As the Pecan Point levee loop represents new construction, rather than enlargement, the contractors had the advantage of working nearby borrow pits which had not been partially depleted of material by previous construction, as is the case on most of the work under way at other places.

DRAGLINE METHOD OF LOADING 5-yd. wagons is employed on levee contract of C. C. ADERHOLDT (*in oval above*).

Mechanical Improvements — Two

HAND-OPERATED DUMP on one of the fleet of 7-yd. wagons owned by Lowrance Bros.

noteworthy mechanical improvements have been made in the equipment for levee construction by elevating graders and crawler wagons. The first of these is on the grader, where a power take-off from the tractor (see detail photo, p. 44) drives the loading belt independently, in contrast to the axle-drive of the older machines. With the old axle-drive the operation of the loading belt was entirely dependent upon the continuous rotation of the wheels of the grader. In the wet, muddy material so prevalent in the Mississippi valley, or in sand, traction is poor, with a consequent slippage, loss of power to the belt and a falling off in yardage delivered to the wagons. With

DELIVERING LOAD at levee top from bottom-dump wagon emptied by ratchet and chain device.

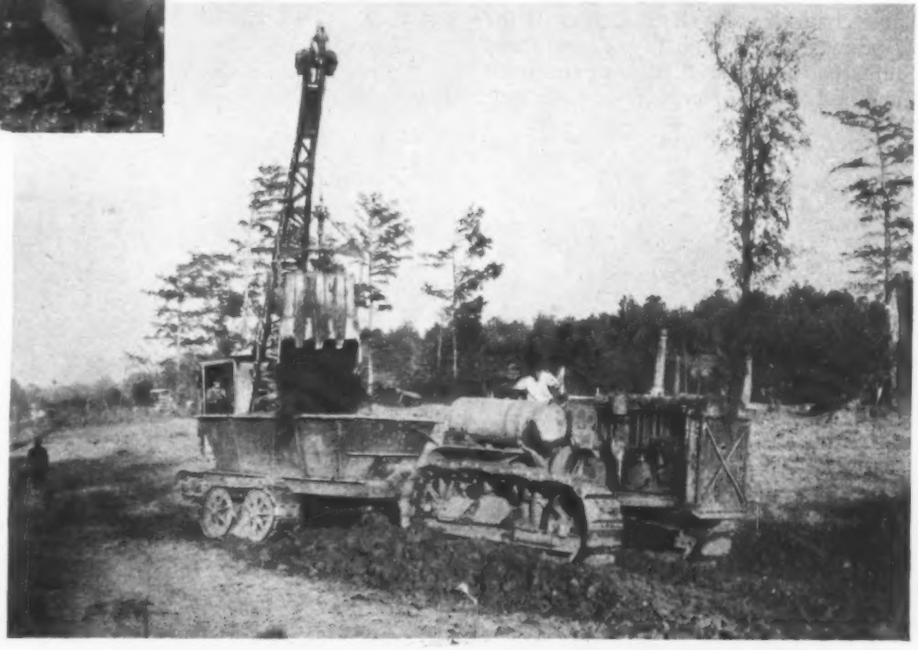
BLAIR LOWRANCE, member of famous levee-building family.

The tractors used on the Mississippi work are almost universally of 60-hp., although some contractors feel that a more powerful unit, perhaps 75-hp., would be better suited to the exacting conditions encountered. Levee work imposes an unusually severe test on any hauling equipment. Most contractors work two 10-hour shifts daily, so that operations are almost continuous. The material, especially when borrow pits become wet, makes travel over, or rather through it, extremely difficult, and demands hauling units that are powerful, sturdy, not too heavy and capable of continuous operation. Experience has demonstrated the necessity of protecting bearings and other working parts from

MISSISSIPPI MUD mires Ford car until FORREST JONES (*second from left*) comes to rescue with mule team.

the power take-off and direct carrier drive the power delivered to the belt is constant, irrespective of the character of the material over which the grader operates. This improved mechanical detail on the elevating grader has almost doubled its output.

The second outstanding improvement in the haulage equipment is the use of a hydraulic dump device on the modern crawler wagons in place of hand-operated ratchets and chains (see detail photo, p. 44). It is directly connected to the tractor and is controlled by the tractor operator. With this equipment no extra man is required to dump the wagons by hand.



TRACTOR-WAGON UNIT is loaded by crawler-mounted dragline on contract of Coastal Construction Co. near Turrell, Ark.

STUMPS in cypress brake must be removed on levee line of E. A. Polk's sub-contract at Pecan Point, Ark.

excessive wear by dust and sand.

Five-Yard Wagons — Wagons are of the bottom-dump type. With the exception of the small mule-team units they are divided between two sizes—5 and 7 yd. On the Lowrance work the 7-yd. size prevails. Elsewhere, however, the 5-yd. wagon is in evidence. An example of its use is on the contract that is being completed in the Rosedale (Miss.) area by C. C. Aderholdt, of Memphis. This contractor is using 5-yd. Austin-Western crawler wagons supplemented by 7-yd. Streich units. They are loaded by a 1½-yd. Northwest dragline and hauled by Monarch "75" and Caterpillar "60" tractors. For the 5-yd. wagons the advantage is claimed that during dry weather they can be "doubled up" and hauled in tandem by a single tractor, yielding a 10-yd. pay load for each trip. In wet weather, with the ground soft, it is possible to haul a single 5-yd. wagon where a 7-yd. unit might tax the capacity of the tractor. In other words, greater flexibility of operation is claimed for the 5-yd. as compared with the 7-yd. wagon under Mississippi River conditions.

The levee work has dictated a desirable change in the running gear of the 7-yd. wagons. Originally most of these units had a pair of wheels at the front end and a pair of crawlers on the rear end. In descending the steep levee slopes of soft material behind a tractor the front wheels sometimes caused the wagon to "jackknife." On the latest wagons of the 7-yd. size front wheels are eliminated and the entire load supported by a pair of crawler tractions.

MAJOR E. C. KELTON seeks solace of his pipe after long inspection trip in second field area of Memphis District.

Other Haulage Contracts—Similar to the contracts above referred to are two others. On one near Turrell, Ark., the Coastal Contruction Co. is employing Koehring 1½-yd. draglines, crawler mounted, to load 7-yd. Euclid wagons hauled by Caterpillar "60" tractors. This is a 300,000-yd. contract at a unit price of 26.7 cents.

Further south at Benoit, Miss., Blair Lowrance, another member of the large family whose name is synonymous with levee building on the Mississippi, is completing a 1,326,000-cu. yd. riverside enlargement haulage job with equipment which includes Caterpillar tractors, Russell elevating graders and 7-yd. Western and LaPlant-Choate crawler wagons.

Near Walls, Miss., on a landside enlargement contract, operations with similar equipment are in progress by Jones & Rodgers, with Forrest Jones in charge. Here, too, the Russell graders are equipped with the improved power take-offs.

Personnel—The work described is in the Memphis and Vicksburg districts of the U. S. Engineer Department, Lieut.-Col. F. B. Wilby and Major John C. H. Lee, respectively, district engineers. Major E. C. Kelton, with headquarters at Memphis, and E. S. Maupin, at Rosedale, Miss., are the area engineers in charge.

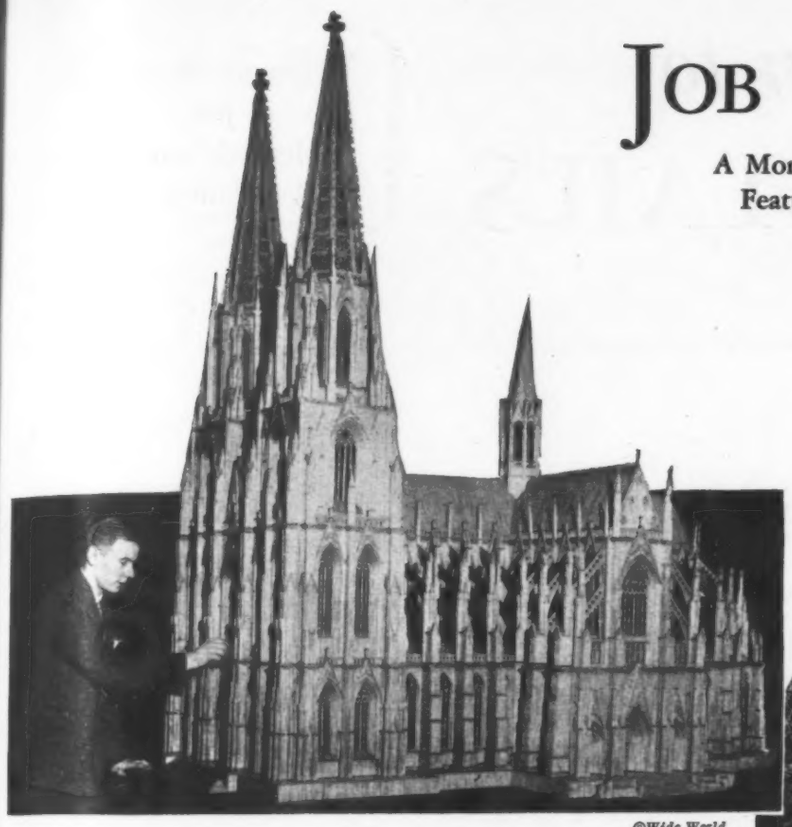
NEXT MONTH: Another article on Mississippi River flood control.

GRADING AND FINISHING of levee slopes is done by mule-drawn fresnos and scrapers.

LONG, STEEP HAULS to levee tops are easily negotiated by tractor-hauled wagons.

JOB ODDITIES

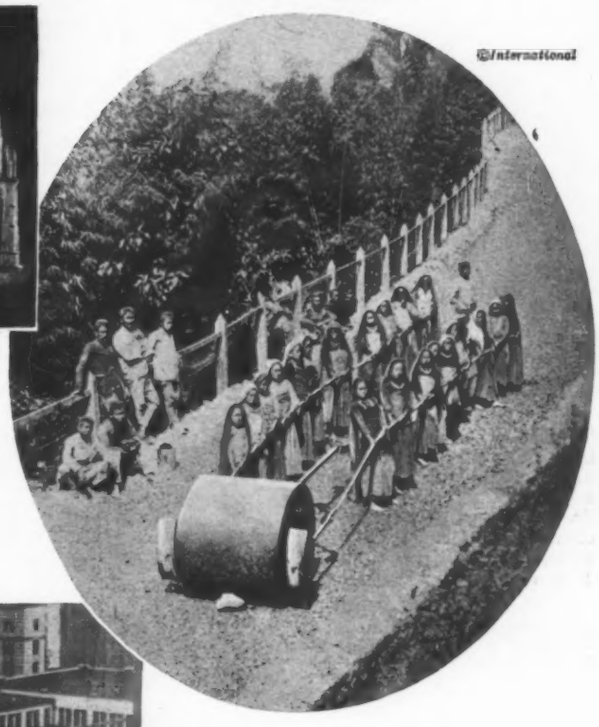
A Monthly Page of Unusual Features of Construction



©Wide World

TWO AND A HALF MILLION MATCHES went into the construction of this unusual model of the Cathedral of Cologne which is said to be an exact reproduction of the original. It was built by Hans Swoboda, a 20-year-old German, who spent four years doing the work. The young builder is seen here putting the finishing touches to his model which stands 10 ft. high without the base.

WOMAN POWER *(below)* in India finds an outlet in highway maintenance activities. Here twenty dusky maidens haul a road roller, while the men take their ease on the side lines.



©International

©Keystone

PARKING ON THE ROOF is one of the latest solutions of the traffic congestion puzzle. These cars are awaiting their owners' pleasure atop the spacious roof of a public market in Seattle.

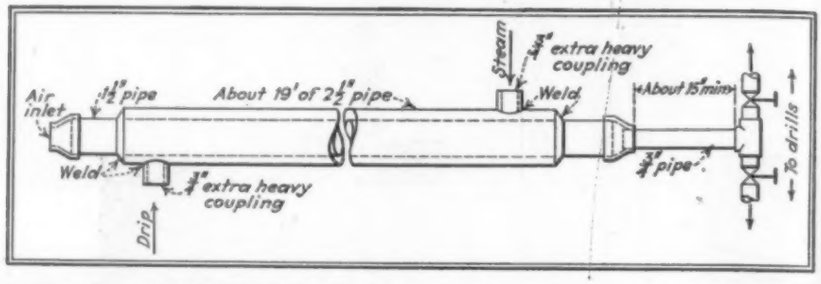
TRANSIT STATION on concrete pile at Chef Menteur bridge, New Orleans, enables engineers to check accurately location of cylindrical piers which are sunk 126 ft. by open dredging.

Getting Down to DETAILS

Close-up Shots of Job Methods and Equipment

TILTING CHUTE operated by tower bucket catches mixer drip. Chute is weighted at mixer end. Descending bucket drops on rope attached to discharge end of chute, tilts chute forward. Western Construction Co., Los Angeles, contractor

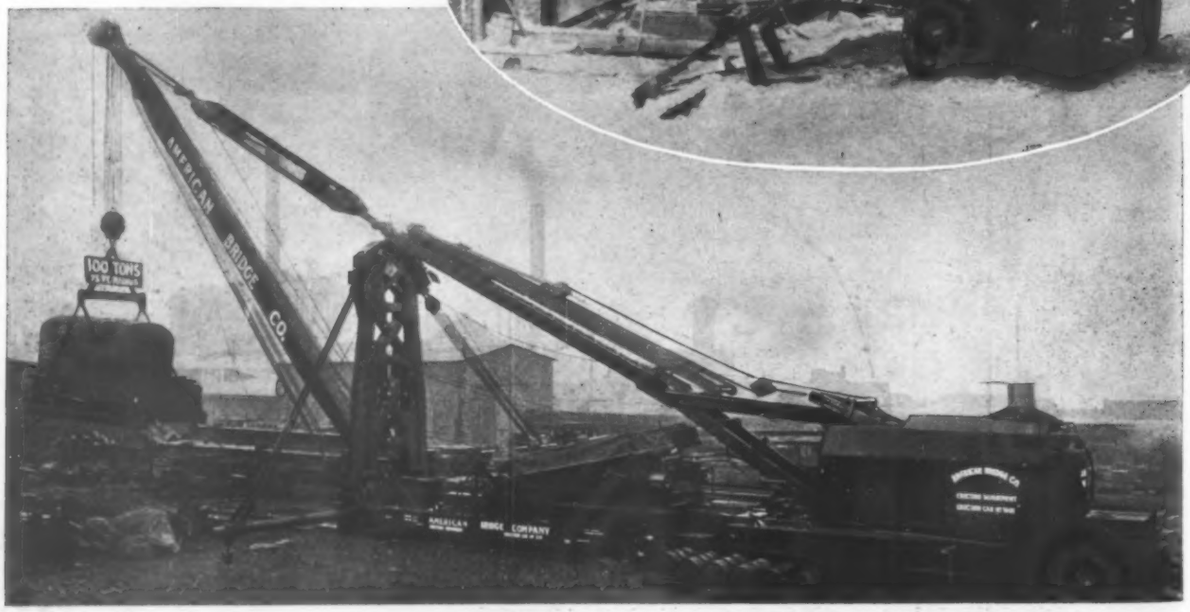
Photographs from Harlan H. Edwards, Supervising Engineer, Scripps College, Claremont, Calif.



HEATER for compressed air, with 100-lb. steam pressure in zero weather, heats air for two or three 1¼-in. drills having 50-ft. hose connections. Valve on drip and insulation increase efficiency.

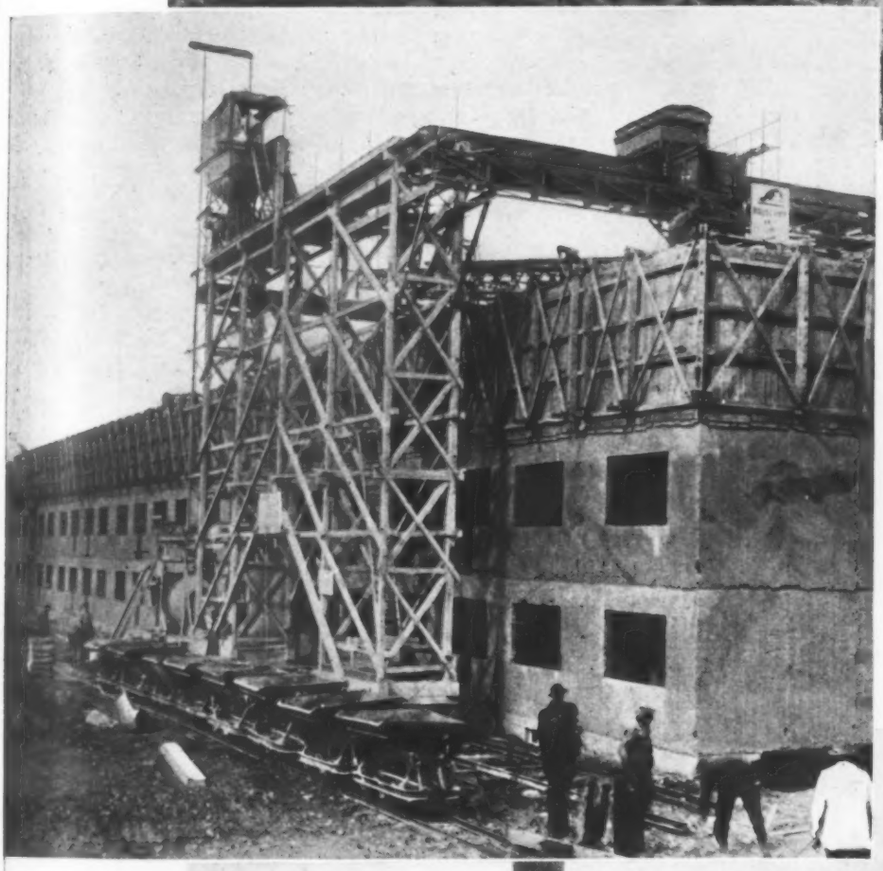
Design from Ira. A. Butcher, Foundation Co. of Canada, Montreal, Que.

BELT CONVEYOR (*below*) loads spoil from cellar excavation. Crowded conditions compel removal of Barber-Greene conveyor from its carriage and of power unit from conveyor to floor above.



NEW COMBINATION LOCOMOTIVE-CRANE-DERRICK-CAR of American Bridge Co. can lift 100 tons at 85-ft. radius and set load 20 ft. off center line of track. Industrial-Brownhoist 150-ton locomotive crane furnishes power for seven-drum Lidgerwood hoisting engine on derrick car, propels car, and serves as anchorage counterweight. Crane also assembles car when outfit is shipped to new job. James L. deVou, central district erecting manager, Pittsburgh, designed car to place long, heavy plate girders.

TRACTOR - MOUNTED TWO-DRUM HOIST operates drag scraper outfit. Willamette-Ersted hoist on Caterpillar tractor makes fill from borrow pit with drag scraper bucket by double-drum control of hauling rope. Outfit can be used on spans up to 350 ft.; most economical operating span is 200 ft.



TRAVELING SCAFFOLD, incorporating mixer, tower hoist, and belt conveyors, expedites placing of concrete in buildings at Bad Durrenberg, Germany. Narrow-gage roll-over cars transport concrete materials to mixer.

©P&A

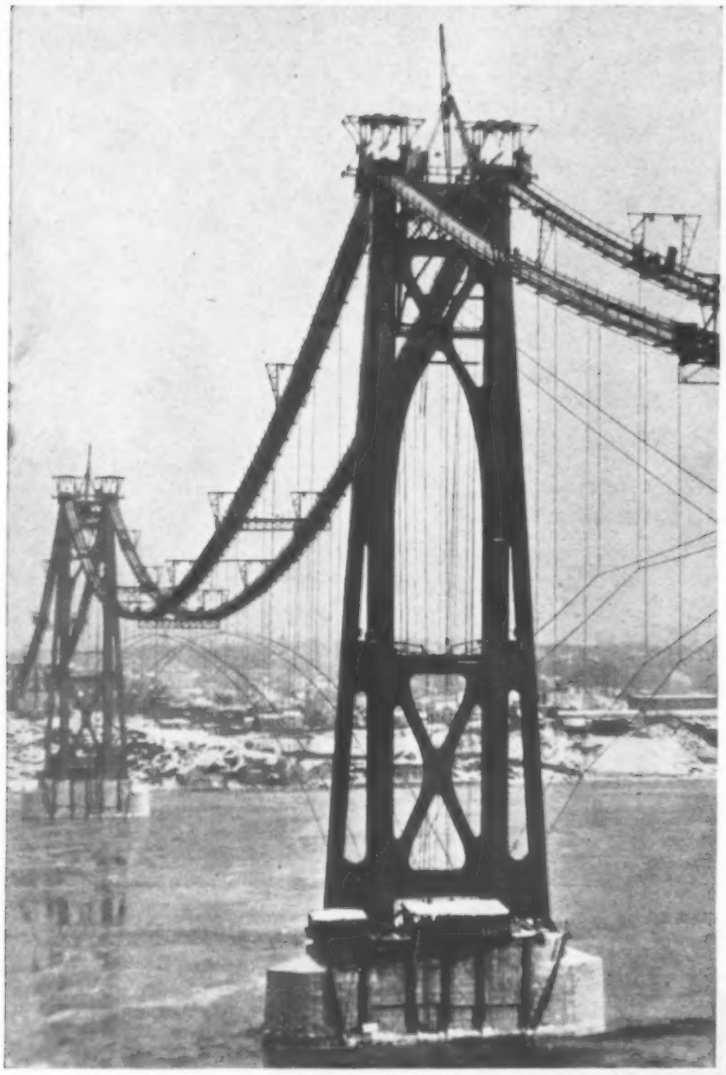
Photo from LEO C. SANDERS, Oklahoma City, Okla.

BELT CONVEYOR ON PAVING MIXER places concrete for triple-box sewer 32½ ft. wide, projecting above ground. Haiss conveyor attachment gives reach, height, and ability to handle very stiff invert mix. Leo C. Sanders, Oklahoma City, contractor.

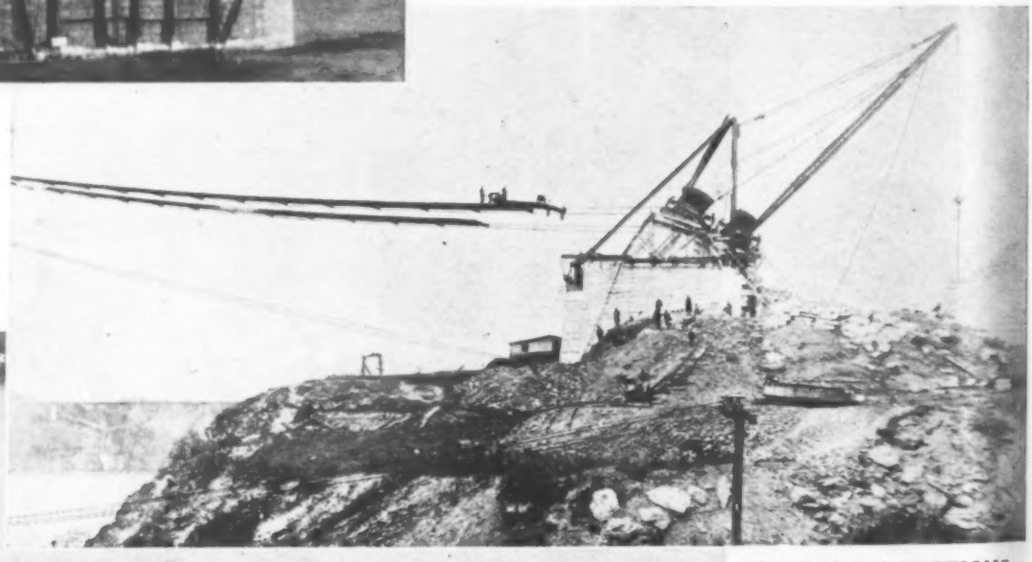
BRIDGEMEN *of Suspension by Aerial*

IN stringing the cables of its first parallel-wire-cable suspension bridge—for the New York State Department of Public Works, across the Hudson River at Poughkeepsie—the American Bridge Company employed essentially the same aerial spinning process invented by John A. Roebling in 1854 for the construction of the cables on the combination railroad and highway bridge at Niagara Falls. Wires composing the strands of each of the two cables of the bridge were strung close to final position, over the towers of the structure, from anchorage to anchorage, by traveling sheaves operating on a rope tramway supported from bents installed along a footwalk erected approximately parallel with the contour of the proposed cable and about 3 ft. below it.

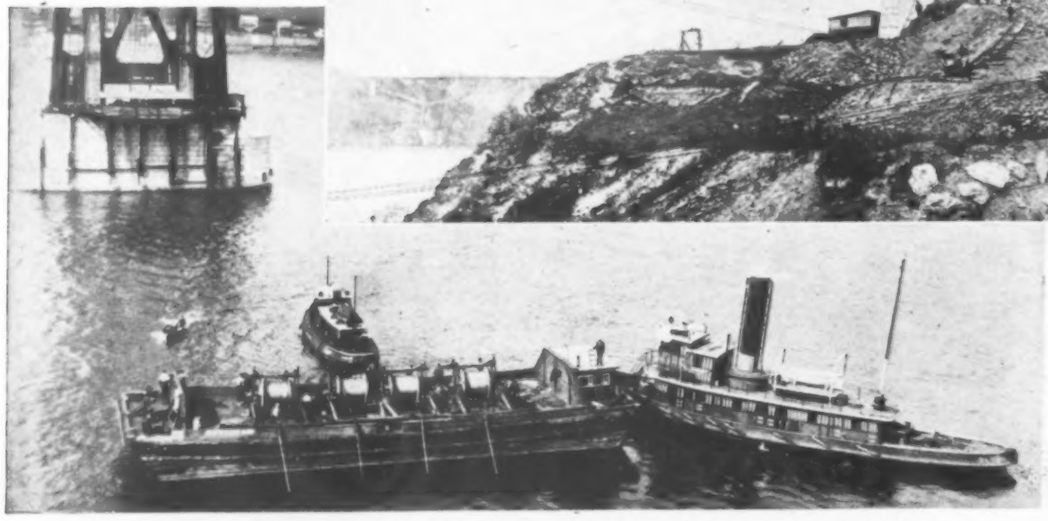
Description of Bridge—The Mid-Hudson bridge is a toll structure being erected by the Department of Public Works for a highway crossing between the towns of Poughkeepsie and Highland, N. Y. It has a main span 1,495 feet long and side spans 750 and 755 ft. in length. A 30-ft. roadway and two 4-ft. 6-in. sidewalks are carried by the stiffening system, which is of the through-truss type.



FOOTWALKS (*above*) are guyed with storm ropes and are stiffened by trussed cross-walks, three on main span and one on each side span. Tramway bents are approximately 200 ft. apart.



FOOTWALK SECTIONS 20 ft. long are slid down from tower and are U-bolted to wire ropes. Rocker castings of east side span in place. Wire ropes to be seen some distance below footwalk are cables used to deflect towers.



FOOTWALK ROPES unreel from barge as tugs tow craft across river. At each tower, numbered buoys are attached to ropes. Derricks on towers lift ropes from river bottom to tower tops.

CONSTRUCT CABLES

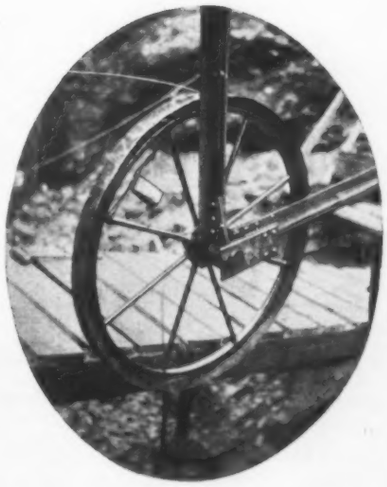
Structure Spinning

Towers of the flexible column type 315 ft. high are erected on masonry piers which rest on caisson foundations. Tower saddles were bolted in place prior to the construction of the cables. The four anchorages of the two bridge cables consist of eye-bar chains connected to plate-girder grillages placed at the bottom of sloping shafts excavated in solid rock, the whole mass of steel being embedded in a solid backfill of concrete placed after the installation of the grillages and eye-bar chains.

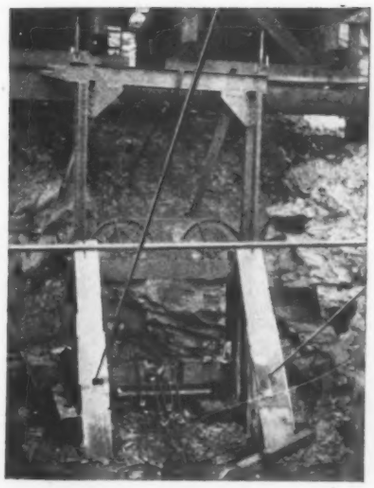
Each of the two main cables, 42 ft. apart, is composed of nineteen strands containing 320 parallel wires, making a total of 6,080 wires per cable. The ends of the strands are looped over steel castings, called strand shoes, which are pin-connected to the eye-bar chains of the anchorages. Strands were spun, four

TRAVELING SHEAVE (*right*) ends trip at anchorage. Loop of wire from opposite anchorage has been removed and placed around strand shoe. Sheave is ready to receive bight from this anchorage before starting on return trip. Strand shoes are mounted in flat position on temporary castings to facilitate stringing operations.

NORTHEAST ANCHORAGE, with spinning of last three strands just completed. Note (1) strand legs hooked over eye-bar pins and (2) yoke, from hydraulic pulling jack, on lowest of three strand shoes.



COWBELL on traveling sheave warns workmen on footwalk of sheave's approach.



SHEAVES at terminal of mono-cable rope tramway can be adjusted by means of long bolts which move bearing beams in guide frame.

JOHN MARTIN is field engineer at the bridge for the American Bridge Co.

GLENN B. WOODRUFF (*right*) is in charge of design and construction for the consulting engineers. C. W. HANSON, resident engineer, directs field operations.

RALPH MODJESKI, of Modjeski & Moran, consulting engineers for the Mid-Hudson bridge

at a time, in temporary position, outside the saddles. When the spinning of four strands was completed, they were seized with flat steel bands and were placed in the saddles. This process was repeated until, on the last operation, only three strands were spun to make up the total of nineteen. When all the strands were placed in the saddles, they formed a cable of hexagonal cross-section. With aid of hydraulic squeezing jacks, the erectors compacted this hexagonal cable into its final circular cross-section, 16¾ in. in diameter, in which there is a relatively small proportion of voids (about 18 per cent) among the wires. The wire was galvanized No. 6 gage, having an average diameter of .192 in. before galvanizing and of .195 in. after coating with zinc.

Anchorage design required that the bridge cables approach the anchorage at a rather steep angle. To change the direction of the side-span cables, which otherwise would be practically horizontal at the anchorage, rocker saddles are placed on piers a short distance in front of the anchorages.

Deflecting Towers—The towers of a suspension bridge, when the structure is completed, should be in a position which will result in the towers' being equally stressed by the two

STRINGING CABLE STRANDS on the main span. Each traveling sheave strings two strands. Note two strands under construction on each side of four strands already completed and in place.

RETAINING DEVICES, equipped with sheaves and hooks, hold two wires of bight during stringing and save workmen from danger of being caught under armpits.

FLAT WIRE BANDS are used to seize completed strand. Tongs grip strand in circular jaws while workman fastens band.

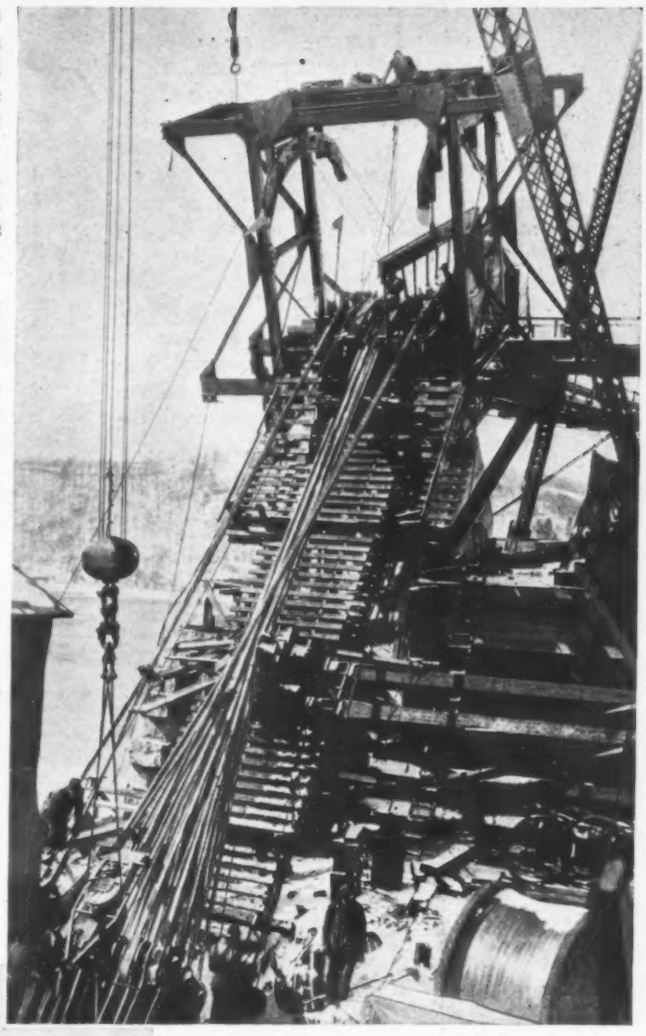
extreme conditions: maximum live load on the near side span at lowest temperature, and maximum live load on the main and far side spans at highest temperature. To attain this equality of stresses, the towers of this bridge, under full dead load, will be inclined 4 in. at the top toward the shores.

Application of full dead load to the cables would have the effect, at normal temperature, of deflecting these towers 6 in. toward the river channel. Allowance for this deflection was made in deflecting the towers, prior to construction of the cables, 10 in. shoreward.

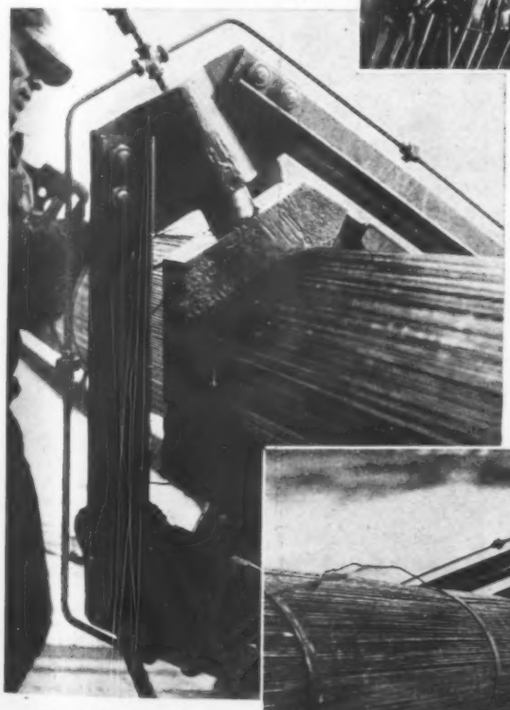
On the Mid-Hudson bridge, this method of deflecting the towers was chosen in preference to the alternative process of setting the saddle castings off the center of the towers and jacking them to correct position after completion of the cables. The 10-in. deflection was obtained by attaching wire ropes, anchored in the abutment foundation, to the top of the tower and by applying initial tension to these ropes with six-part fall blocks operated by hoist engines. Final adjustment was made with 2-in. turnbuckles.

Footwalks — To string the bridge cables, it is necessary to have construction footwalks to carry the bents of the rope tramways and to give workmen access to the cables at all points. It is the usual practice on bridges of this type to construct the footwalks with the wire ropes which later will be used for the suspender ropes of the bridge. The Mid-Hudson bridge contractor followed this practice, supporting each footwalk on four $1\frac{7}{8}$-in. wire ropes. Ends of the footwalk ropes were connected into the permanent anchorages.

Rope Tramway — Each walk was equipped with an endless rope tramway carrying two traveling sheaves. These sheaves were spaced about 3,300 ft. apart, so that one sheave was at the east anchorage when the other sheave was at the west. They passed each other at the center of the main span. The electric motor operating the traction rope had a reversible rheostat control which permitted the rope to be driven alternately in opposite directions. This rheo-



HYDRAULIC LIFTING JACKS mounted on trolley beams above tower and rocker saddles pick up strand simultaneously from temporary spinning sheaves alongside saddles and place it in saddles. Equalizer beams on lifting jacks grasp strand with metal straps at a number of points to prevent kinking of strand. Between rocker saddle and anchor eye-bars, temporary casting on wood bent retains strands during construction of cable. Splay casting will be placed on cable at this point.



HYDRAULICALLY OPERATED PISTONS (*above*) exert pressure upon 120-deg. segments of squeezing ring.

WOOD BLOCKS (*right*) hold cable to hexagonal shape prior to squeezing operations.

SQUEEZING JACKS (*left*) compact cable into $16\frac{1}{4}$-in. circular section. Workmen compact cable and seize it with soft steel wire at 3-ft. intervals.

stat control also allowed the operator to increase the speed gradually, as the traveling sheaves started on their trips from the anchorages. The driving machinery included three sets of gears which provided speeds of 200 ft., 300 ft., and 400 ft. per minute. Wire stringing usually was done at the highest speed.

WORKMEN bevel ends of broken wire to make coupling. Beveled ends keep wire from turning inside threaded nipple.

Cable Wire—About 100,000 ft. of continuous wire was placed on a reel by the American Steel & Wire Co., for shipment to the bridge. The coils composing this length of wire were coupled together with threaded nipples having right- and left-hand threads. Ends of the wires were threaded and, also, were beveled to prevent their turning inside the sleeve coupling. Splices of bridge wire in the field were made in the same way.

Determining Lengths of Cable Wires—The first operation of the spinning process is the setting of a guide wire to correct sag in the center and side spans to serve as a pattern for all the wires in the cable. The engineers placed this wire in the saddles and adjusted it to correct deflection by instruments. After determining the proper length of the guide wire by these means, the guide wire was placed in the temporary sheaves alongside the saddles, and the correct lengths of the first wires of the strands were determined by comparing their sags with the sag of the guide wire. The guide wire then was laid to one side, and the remaining wires of the strand were strung in conformity with the initial wires.

Stringing of the wires in other strands (these strands being of known different length) was started by adjusting the guide wire to the correct length and by setting the first few wires to the same sag as the guide wire.

Spinning Process—Four strands of a cable were strung at one time. Each of the two sheaves on the rope tramway carried a loop of wire on each trip from a reel at the anchorage where the sheave started on its trip. Thus, one reel had to be mounted at each anchorage for each of the two traveling sheaves. Each reel supplied a continuous wire for one strand. As each traveling sheave carried a bight of wire, it strung two parallel wires of one strand per trip in one direction—and two parallel wires of a second strand per trip in the opposite direction.

When the traveling sheave reached the end of its trip at an anchorage, the bight of wire was removed from the sheave and was placed around the strand shoe and clamped. The two parallel wires had to be adjusted to correct length immediately after being strung. As the traveling sheave carried its bight of wire across the bridge, one part of the bight, called the live wire, was unwound from the reel at the anchorage; the other part, known as the dead wire, was stationary, being clamped at the strand shoe. Separate adjustment of the length of wire was made for each span. The dead wire, because it was fixed at one end, could be adjusted, span by span, as the traveling sheave traversed the bridge. Adjustment of the live wire, of course, could not be made until the traveling sheave had reached the end of its trip and the adjustment of the dead wire had been completed. To complete the adjustment of the dead wire, the slack from this wire had to be rendered around the strand shoe to the live wire side.

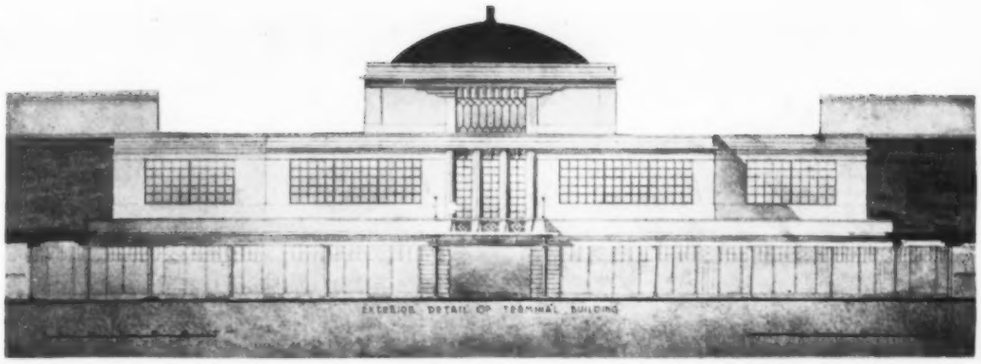
To make the adjustments in the three spans, a crew of men was stationed at each anchorage and at each tower. At each of these adjustment points, the cable was fitted with a clamp to hold the wire when an adjustment was completed. To adjust the wire to correct length, each crew used a block-and-fall outfit equipped with a come-along, a clamp which gripped the wire tightly without scoring or bending it.

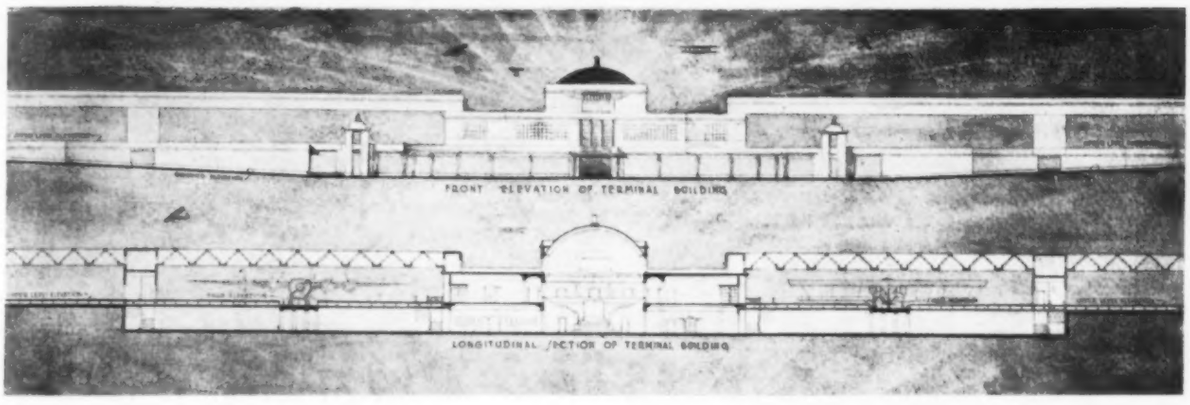
The crews received electric lamp adjustment signals from workmen at the centers of the spans. Each of these workmen operated a bank of three electric lamps of different colors at each extremity of his span. The three adjustments of the dead wire were made as the sheave reached the crews: (1) at the first tower, (2) at the second tower, and (3) at the anchorage. Adjustments of the live wire then were made in reverse succession back to the original anchorage.

Adjusting Strands — The anchorage eye-bars of the Mid-Hudson bridge are in a vertical plane, and the position of the strand shoes when connected to the eye-bars also is in that plane. As an aid to stringing operations, the strand shoes were mounted in flat position on temporary steel castings, known as strand legs, which hooked over the eye-bar pins. To adjust the strand and to take the pull of the strand off the strand leg before removing this temporary casting a hydraulic jack was used. The jack was attached in the anchorage and was connected to the strand shoe by means of a yoke. Strand shoe design provides for adjustment of the strand by means of shims placed between the pin and the back of the casting. After the adjustment had been completed and the jack had taken the load from the strand leg, the leg was removed, and the strand shoe was turned 90 deg. and pinned into the anchor eye-bars.

Supervision — The Mid-Hudson bridge is being constructed under the direction of Frederick Stuart Greene, superintendent of the Department of Public Works, Albany, N. Y. L. S. Hulburd is resident engineer for the department. The consulting engineers are Modjeski & Moran, of New York City, with Glenn B. Woodruff in charge of design and of field supervision. C. W. Hanson is resident engineer for the consultants. Operations of the American Bridge Company are under the supervision of H. H. Starr, engineer, Erection Department, Philadelphia. W. J. Ward, foreman, and John Martin, field engineer, direct the work at the bridge.

CLAMP on arm of strand leg holds wire after adjustment has been completed. Note come-along on fall block used to adjust wire.





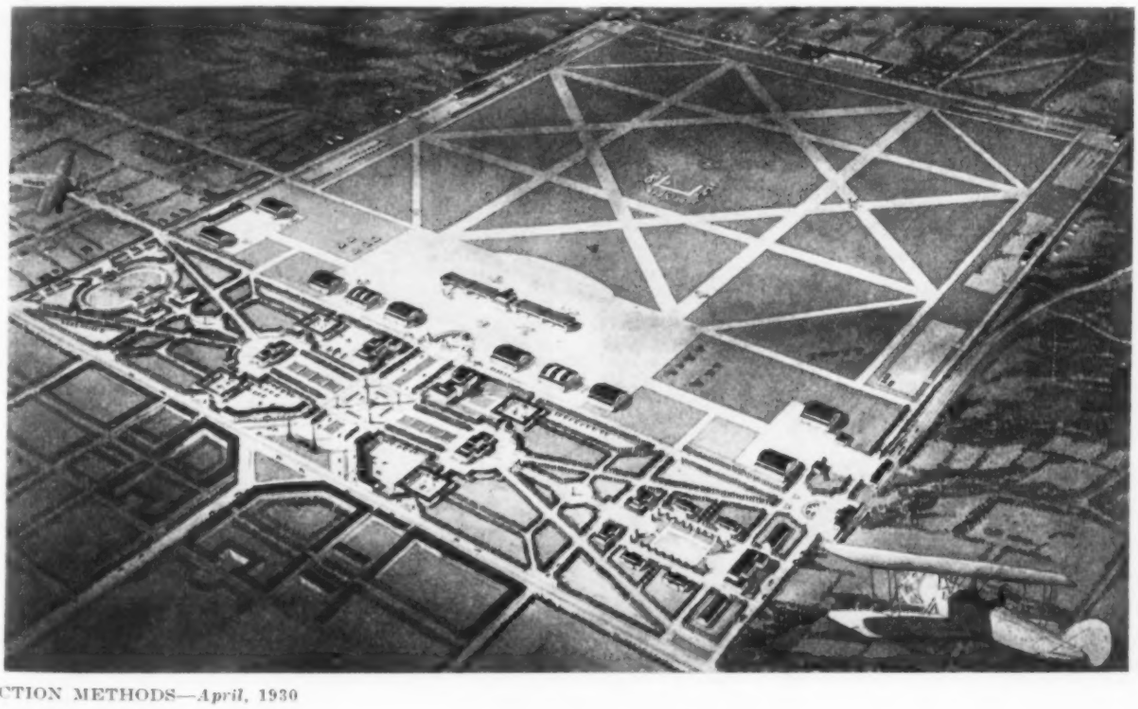
AIRPORT WITH COVERED DOCKS

Wins Third Design Prize

THIRD prize of $1,000 in the Lehigh Airports Competition was awarded jointly to Odd Nansen of East Orange, N. J., and Latham C. Squire of New York City, for their plan of a modern airport serving a typical American city. The contest was sponsored by the Lehigh Portland Cement Company as a contribution to the advancement of civil aeronautics.

This plan employs a rectangular flying field with the major terminal buildings arranged along one side adjacent to a future park and plaza which will be developed as traffic and business conditions require. The plaza will contain its own railway terminal with underground approaches, a hotel, fair grounds, grandstand, stores, shops, and other appropriate business and recreational activities. The airport passenger terminal has two sets of covered docks for incoming and outgoing planes.

First and second design prizes were shown on p. 35 of the February issue and p. 39 of the March issue of *Construction Methods*.

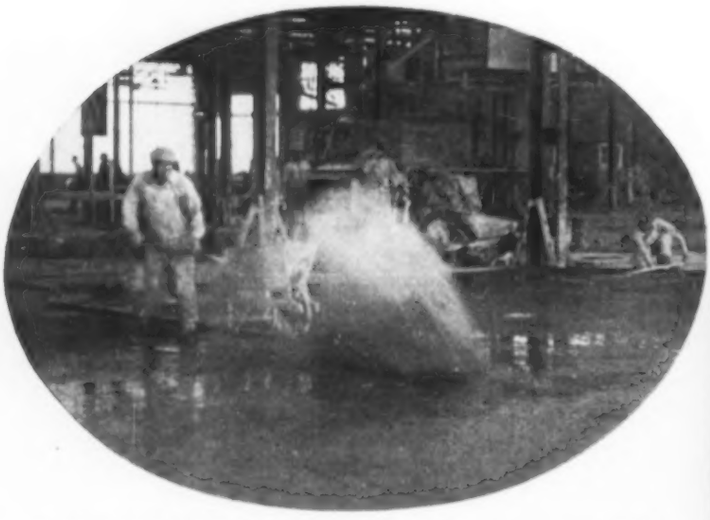


1 SCREEDING with long 2x4's is first operation in installing heavy-duty, monolithic concrete floor hardened by methods specified by Master Builders Co., Cleveland. With crushed stone aggregate the mix is 1:2:4 and with gravel 1:2½:5.

2 TAMPING. On large operations concrete is tamped with long heavy planks which pound it until it is compact and level.

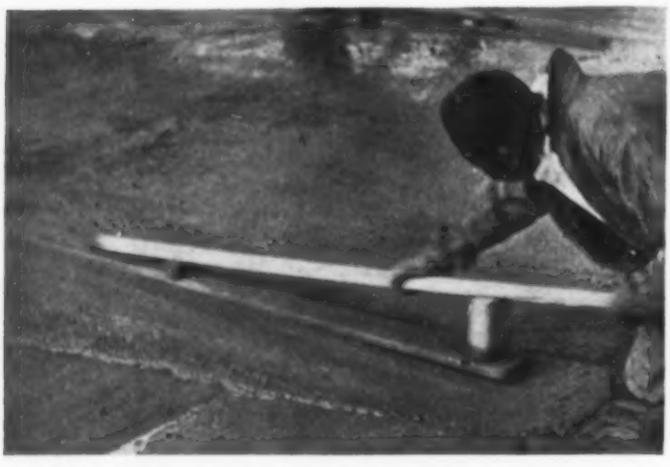
Step-by-Step

Installing a Heavy-CONCRETE



3 PRELIMINARY HARDENER COAT then is applied. This consists of a dry mixture of 100 lb. of Metalicron, a metallic hardener, 200 lb. of Portland cement and 300 lb. of clean, coarse sand which, when distributed over the surface, takes up excess moisture.

5 SECOND HARDENER APPLICATION is made, the amount depending on the usage to which the floor will be subjected. The proportion is 4 parts, by weight, of Metalicron to 3 parts of cement in all cases. For ordinary floor traffic 32 lb. of Metalicron and 24 lb. of cement, mixed dry, are used for every 100 sq.ft. of surface.



4 LONG-HANDLED DARBIES thoroughly float the preliminary hardener into the concrete surface of the floor.

6 THOROUGH FLOATING of the second hardener application with wooden floats is followed by . . .

7 FIRST TROWELING. Floated surface is completely gone over with steel trowels and then left to harden until just before final set.

Field Methods

Duty Hardened SLAB FLOOR

8 SECOND TROWELING. Just before final set, floor is given another troweling which compacts surface and prepares it for . . .

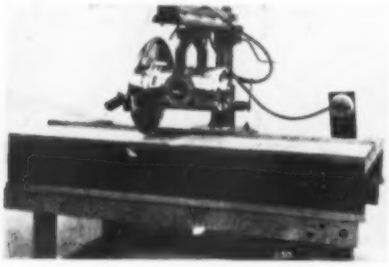
9 BURNISHING. Workman *(above)* placing both hands on handle of steel trowel, puts his full weight on it, lifts leading edge slightly and moves it rapidly across the floor. This operation compresses the surface and gives it a smooth, glossy, long-wearing finish.

10 PROTECTION *(right)* from staining and marring is assured by the application of a coat of Stainproof which insures proper curing of the floor by preventing too rapid evaporation of moisture from the cement.

NEW EQUIPMENT ON THE JOB

Portable Saw for Builders

A portable, heavy-duty, woodworking saw said to reduce cost of concrete form construction and elevator and scaffold building 50 per cent is now ob-



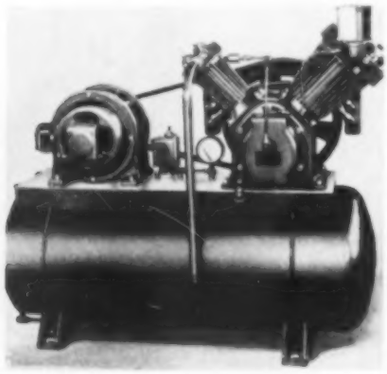
tainable from the De Walt Products Corporation of Leola, Pa.

This saw will rip, cross-cut, miter and bevel-cut with equal facility and can be changed quickly from one type to another. It will rip 4-in. fir at the rate of 50 lin. ft. per minute with a 16-in. saw.

▼

Saves Power and Floor Space

A substantial reduction in floor space and saving in power of from 10 to 30 per cent are two of the advantages of the new, small, air-cooled, two-stage air compressors recently placed on the



market by the Ingersoll-Rand Co. of New York City.

Each unit is self-contained, the motor and compressor being mounted on a steel base which is attached to the top of the heavy, pressed-steel air receiver built to withstand a working pressure of 200 lb. The compressor is ready to operate as soon as electric connections have been made.

These compressors are built in sizes ranging from 3x1¾x2 in., with a piston displacement of 3.25 cu.ft. per minute, to 5x3x3½ in., with a displacement of 19.9 cu.ft. per minute.

▼

New Adjustable Road Form

The Uni-Grade Road Form is described by its manufacturer, the George O. Harm Co., Warren, Ohio, as a strong, rigid, adjustable form which eliminates careful subgrade preparation, facilitates line and grade correc-

tions, and simplifies setting around curves.

The forms include two units. Broad pedestals support 10-ft. sections at joints and centers. A vertical post in the pedestal has a 2-in. wedge adjustment. Total vertical adjustment range is 3½ in.; lateral wedge adjustment is 1½ in. Wedges are attached securely.

▼

Grader Handles Five Jobs

Five earth-moving operations are performed by the new Bali wagon grader, a recent product of the Blaw-

Knox Co., Pittsburgh. This machine digs, loads, transports, dumps and spreads.

One man handles the unit (two digging buckets of 40-cu.ft. capacity each), controls the cutting depth, and loads the buckets without scarifying in hard, gravelly clay in hard adobe, in gumbo, and in oiled gravel roads.

Welder-Compressor Combination

Steel and tank erection contractors, as well as those engaged in pipe line work, will find of interest the latest engine-driven welder-compressor com-

bination produced for use on their jobs by Schramm, Inc., of West Chester, Pa.

This combination consists of a 300-amp. welder and a 120 Schramm compressor mounted on a Ford truck chassis, a steel-wheeled truck, or a spring-mounted trailer. It provides the contractor with means of drilling holes and cleaning surfaces when necessary in order to make satisfactory bond by the welding process.

▼

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Milwaukee, Wis., has evolved the Rex Mix-Haul, a light, portable mixer in 2-, 3- and 4-yd. sizes, designed to fit any make of truck. This unit is entirely self-contained and has its own power plant and take-off. It is mounted low on the supporting frame, has a large charging opening, a variable flow discharge chute and an independent easy-turning drum with three-point, anti-friction suspension. The drum is driven by a Chabelco chain. The transmission is fully enclosed and operates in a bath of oil.

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THERE are jobs that can be handled cheaper with big machines than with the ½ yd. Universal 35. There are a lot of jobs that look like big machine jobs that a Universal 35 can actually handle at lower costs. But why guess about it when you can get the facts and figures?

Write us that you want to talk costs, no obligation, we'll show you the records, then you can buy knowing whether or not you're getting the most profit from the job.

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One investment gives you a machine you can operate with shovel, crane, clamshell, dragline, or skimmer scoop boom.

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You will hear this statement, by P. J. McGinnis, repeated, with slight variations, by fleet operators everywhere:

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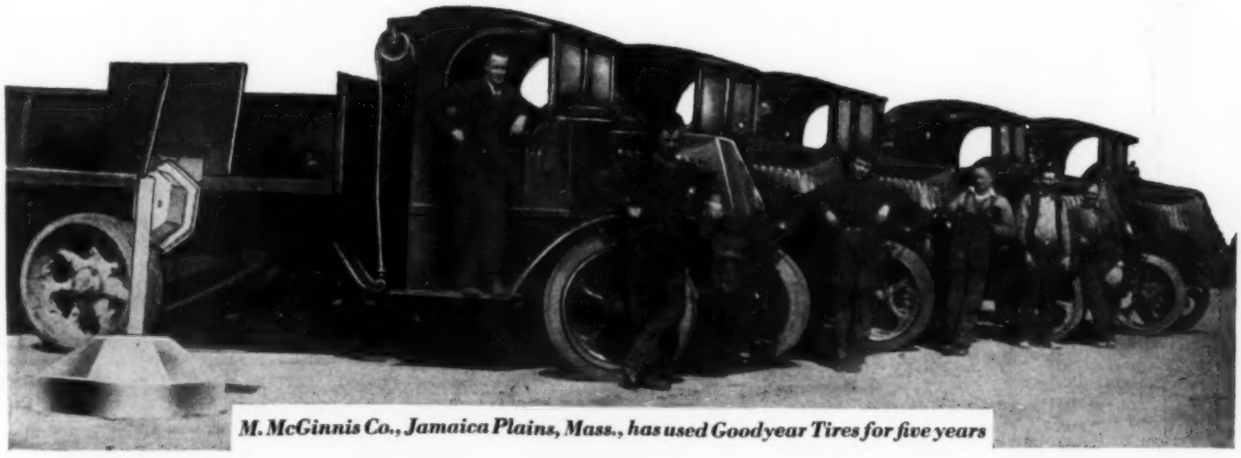
Call on any Goodyear Truck Tire Service Station for recommendations covering the *right* tire for your hauling.



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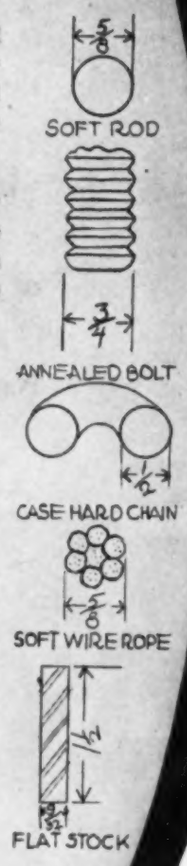

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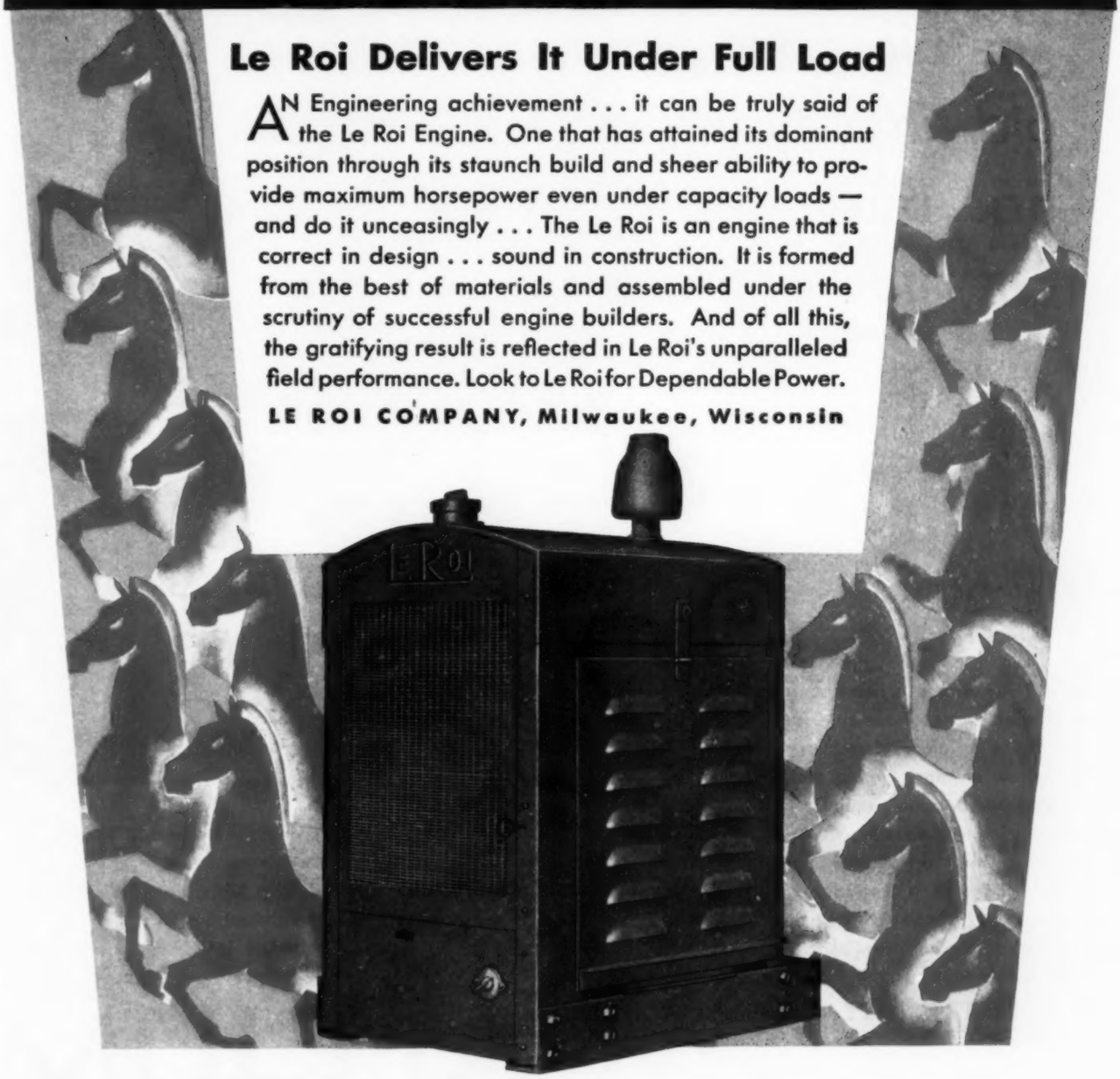

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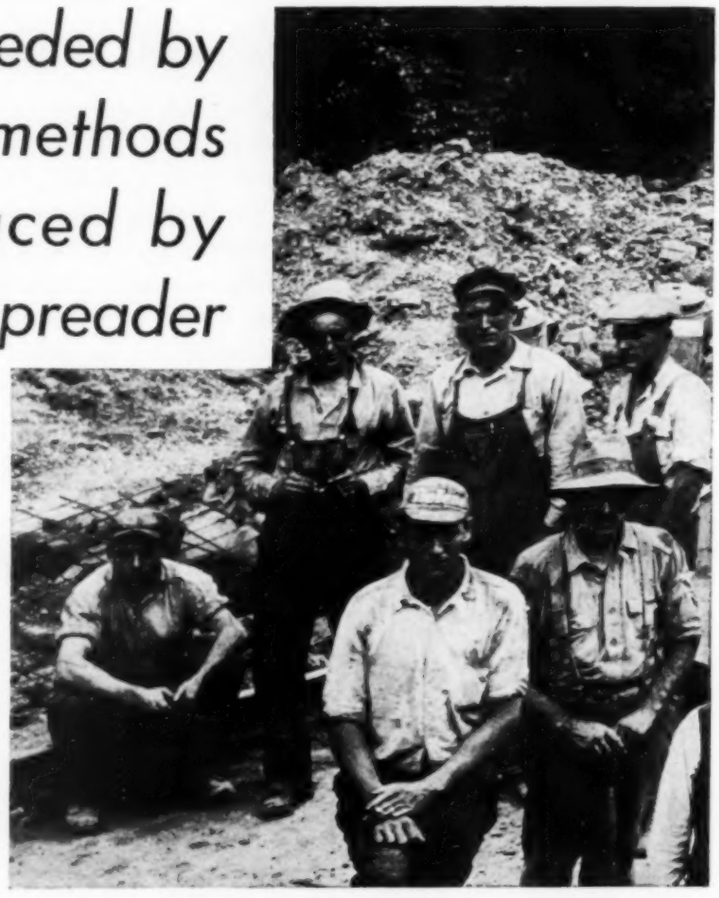

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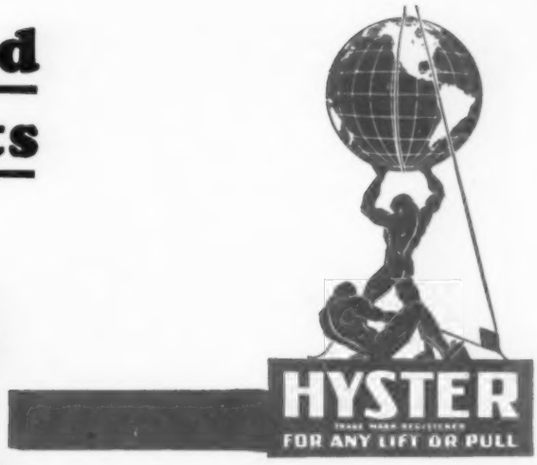

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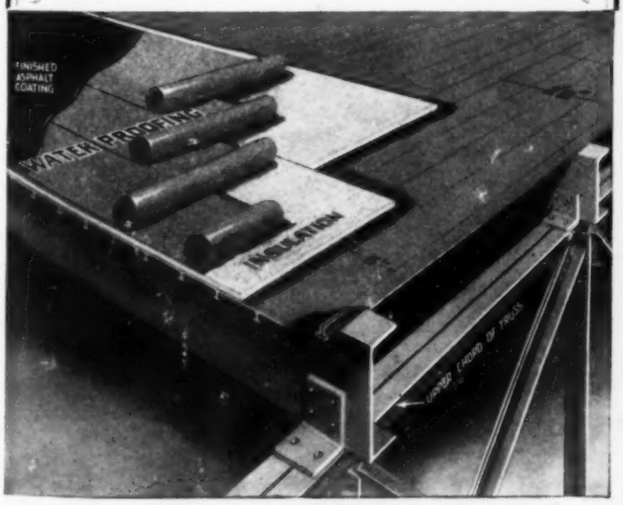
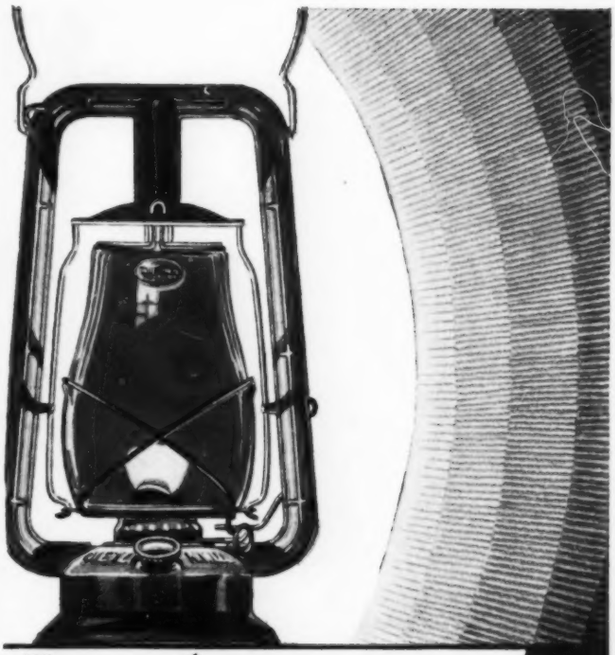
Build Now While Costs Are Low



Truscon Steeldeck Roof with I-Plates



In the Public Eye

EVERY motorist knows that a "Red" Lantern on the highway means DANGER—and most of these lanterns are DIETZ Lanterns.

In this day of confusing traffic lights can you think of any warning device so universally understood, so economical a guardian of your interests and the public safety, as a Dietz Red Lantern?

The Lantern pictured is Dietz "Monarch," of hot blast type—used by large numbers of Contractors because of its dependability and moderate price.

R. E. DIETZ COMPANY
NEW YORK

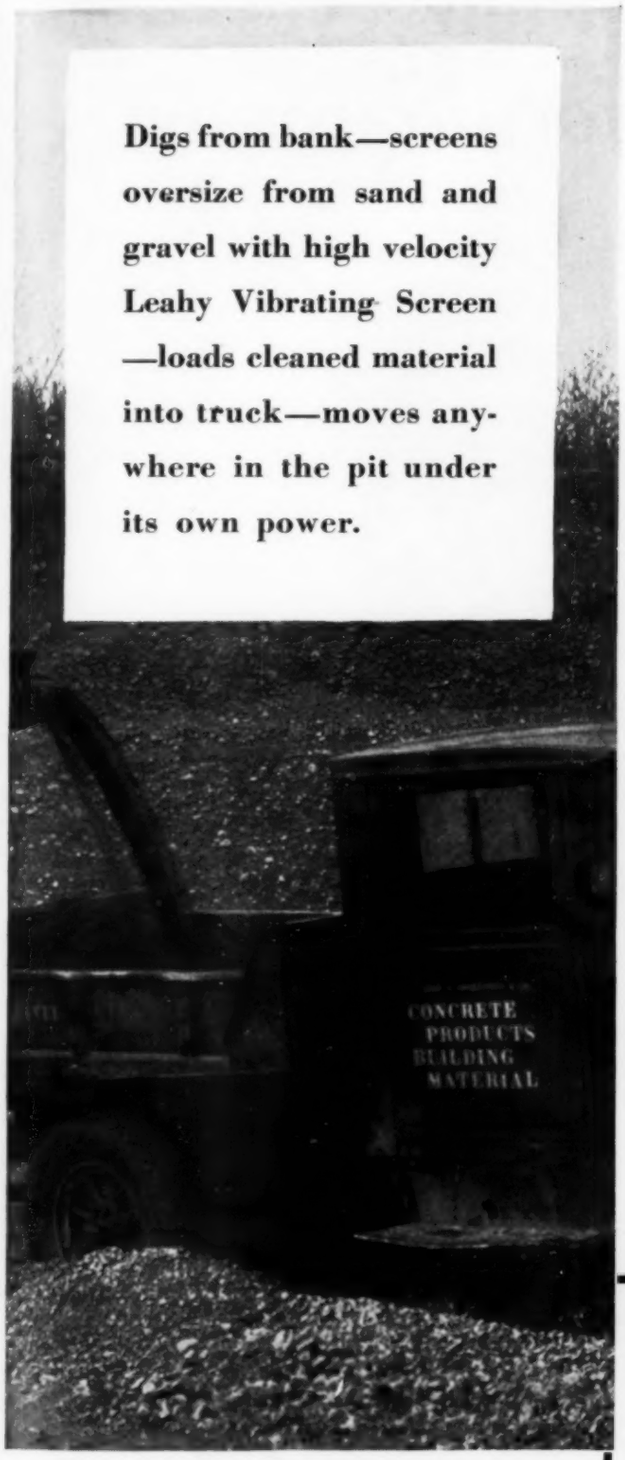
Largest Makers of Lanterns in the World
FOUNDED 1840

A One-Man

The screened sand is delivered by the conveyor, as shown here—the gravel by the spout at the rear of the machine. By simply flipping a gate the oversize will be discharged onto the sand conveyor for gravel loading—or down the gravel spout, permitting sand loading.

BARBER B STANDARDIZED MATERIAL HANDLING MACHINES G **GR**

Sand *and* Gravel Plant



Digs from bank—screens oversize from sand and gravel with high velocity Leahy Vibrating Screen—loads cleaned material into truck—moves anywhere in the pit under its own power.

In this single compact New Barber-Greene Machine you have combined all the functions usually found in a big, elaborately equipped, pit set-up.

This one-man Barber-Greene digs directly from the bank. It carries the material directly to its own high-velocity Leahy Vibrating Screen, operating at about 1600 v.p.m.

This efficient screen removes all oversize, and separates the sand and gravel. And clean material of the proper size is loaded into your waiting trucks or wagons at a ¾-ton-per-minute rate.

One man handles the entire outfit and its every operation. One man moves it to any spot in the pit where it is ready to go to work immediately upon arrival.

Naturally the initial and operating costs of this Newest Barber-Greene average far below those of other equipment performing the same work.

So if you're interested in getting screened gravel and sand—without a big gang—at a speed that keeps trucks moving out of the pit—without elaborate and expensive equipment—at new, low per yard costs, look into this new Barber-Greene.

This coupon brings you the Barber-Greene Leahy-Screen brochure which tells in more detail what the outfit is and can do on the type of work you have in mind.

Send the coupon today—there's no obligation, of course.

BARBER-GREENE COMPANY
530 West Park Avenue, Aurora, Illinois

BARBER-GREENE COMPANY
530 West Park Avenue, Aurora, Illinois

This coupon brings the complete information on the New Barber-Greene One-Man Sand and Gravel Plant, for which we haven't room in this advertisement. Send it today.

Name .....

Address .....

City ..... **State** .....

R E E N E

The "Forty-Niners" would blink their eyes —at *these* California roads!

TWO fine sixty-foot California roads, on the outskirts of Los Angeles. The concrete is perfectly and lastingly protected by Carey Elastite Expansion Joint, installed both longitudinally and transversely.

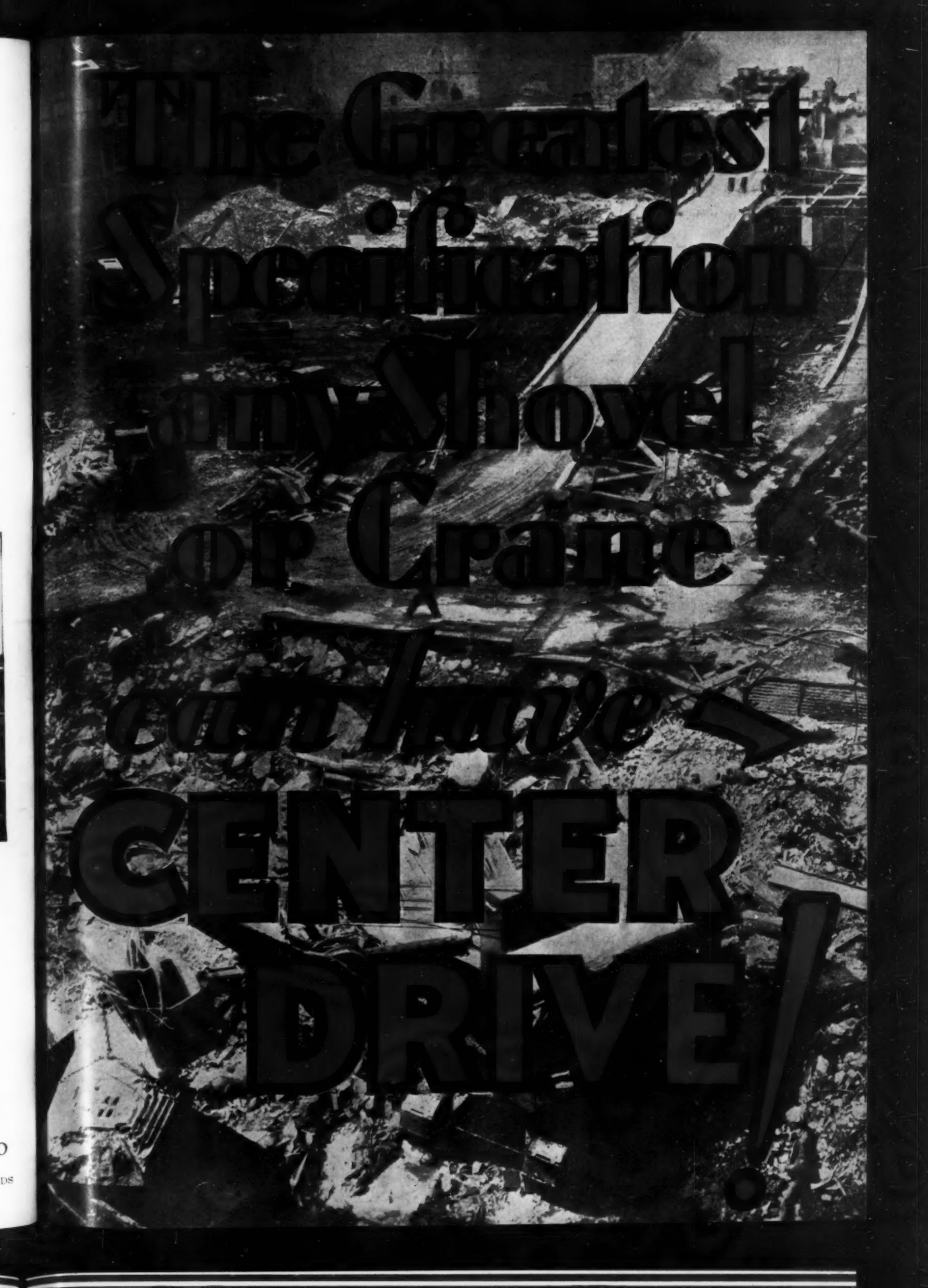
DIFFERENT, aren't they, these concrete Western Coast highways from the rutted "Westward Ho!" trails of the covered wagons? Yes, indeed! Smooth as a table-top, mile after mile. And engineered to *stay* smooth, too—for they are protected by *Carey Elastite Expansion Joint.*

. . . two tough strips of asphalt-saturated felt, with a filler of asphalt and fibre—Carey Elastite Expansion Joint! Preformed—quickly installed in any weather—as easy to handle as a board.

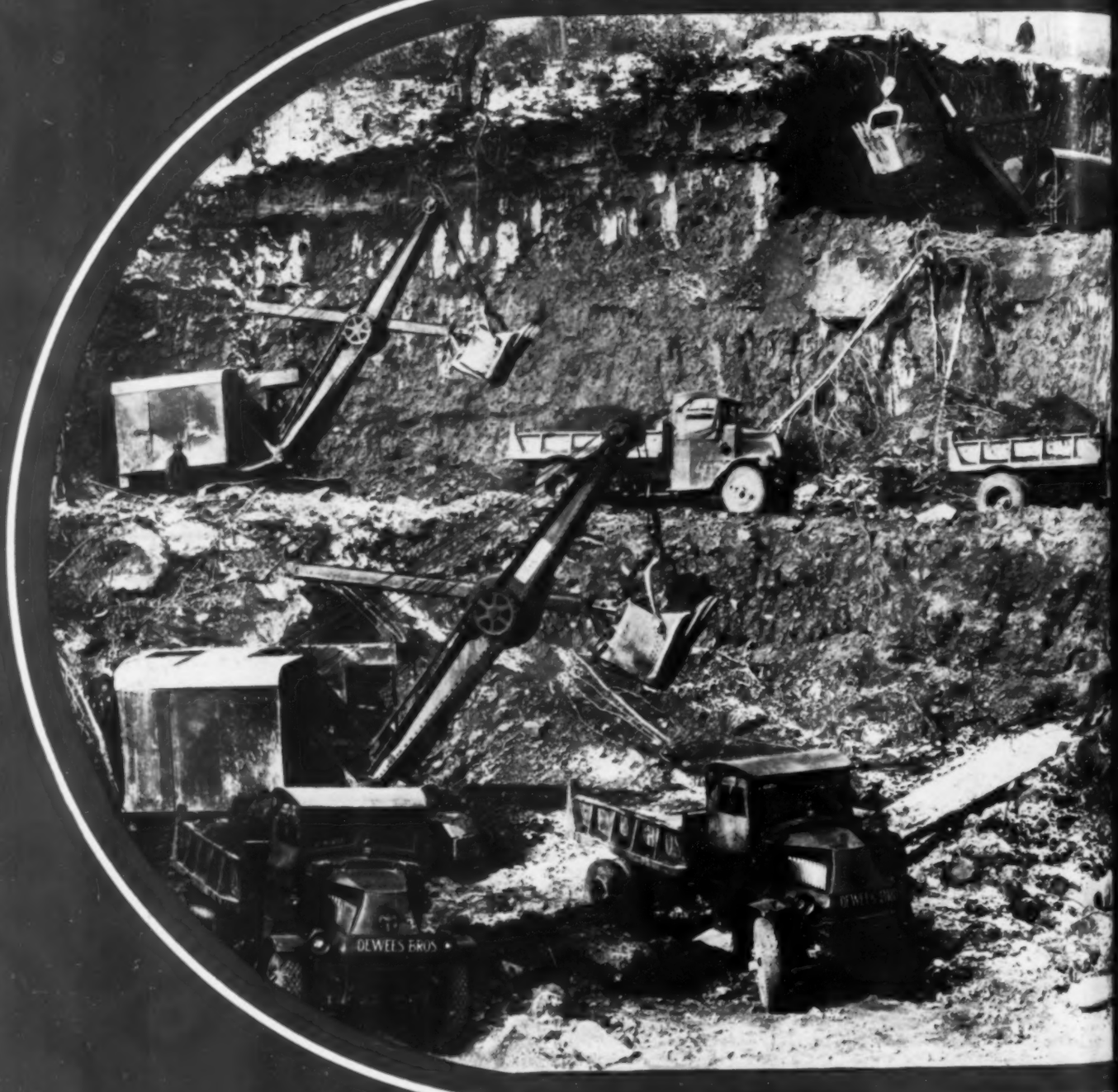
IN every State of the Union, contractors and construction engineers are using and recommending this pioneer, give-and-take "sandwich" joint. For city streets and state highways, for bridges and dams—to protect the concrete against expansion and contraction strains. Have us send you full particulars about Expansion Joint installation.

Carey Elastite EXPANSION JOINT

THE PHILIP CAREY COMPANY, *Lockland*, CINCINNATI, OHIO


The Greatest
Specification
in any Shovel
or Crane
can have
CENTER
DRIVE!

It doesn't appear in the Purchase Price



LORAIN 45-55-75

SHOVELS—CRANES—CLAMSHELLS

DRAGLINES—BACKDIGGERS—SKIMMERS

¾ yd.—1 yd.—1¼ yd.—1½ yd. Shovels—Clamshells—Draglines

But it does show up on the Job

LORAIN machines are different from any other crane or shovel. It's a difference that doesn't show up in the first cost—but it looms large when you put the machine to work. Then you know what the Center Drive specification means—less expense and less trouble with your crawler, greater power and flexibility of turntable operation, greater shovel range.

LORAIN 45-55-75

SHOVELS—CRANES—CLAMSHELLS
DRAGLINES—BACKDIGGERS—SKIMMERS

10—12½—15 ton Crawler Cranes

15—20 ton Locomotive Cranes

Tough Jobs are Easy for LORAINS

All over the world you can see them—Lorain 45's, 55's, 75's moving dirt, digging rock, handling material. They may be dented up, muddy, paintless, or brand new. But they are sound underneath the surface, built with the rugged stamina made possible by the Center Drive design.

So fundamentally correct is this design that after six years of use it is still the greatest specification any shovel or crane can have. It must be good to have stood this test of time and use. And it is as good, as sound, as far ahead today as when it was first used to revolutionize shovel and crane design.

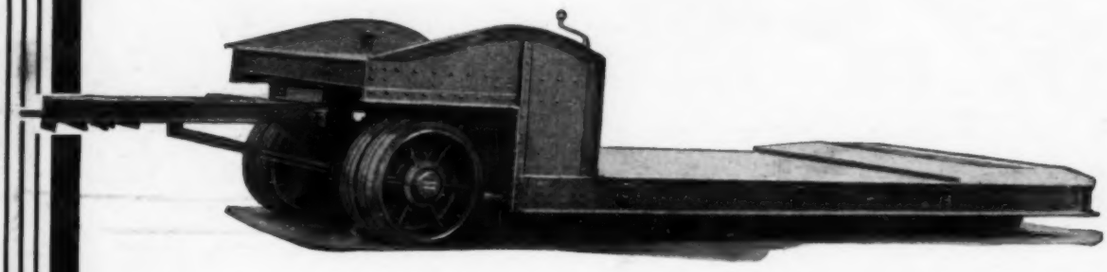
THEW CENTER DRIVE

The THEW SHOVEL Co.
Lorain, Ohio

The new WILLIAMS 5-axle trailer

that contractors say

is without an equal for heavy loads



YOU have bigger overload capacity with this trailer of modern design— the 5-axle WILLIAMS "Arch-Girder" Trailer.

It has *extra strength, without increased weight.*

Look at the unique rear-end design, with each rear wheel having a separate axle, supported at both ends. No overhang.

Rigid cast-steel frames carry the rear wheels in pairs —and each frame is free-swiveling, keeping the trailer's load evenly distributed. Plenty of clearance, so that the wheels can't jam.

Stronger front end— with the deep arch-girders reinforced by sturdy steel stiffeners. No buckling. *Big front axle bearing*, with 40% greater factor of safety than usually found on trailers of same rated capacity.

The heavy-duty trailer that's *right*, from skids to drawbar. Look it over!— make your own comparisons — and you'll decide on the 5-axle WILLIAMS "Arch-Girder" for *your* next trailer.

Easier to load—to haul—and to brake with load

You save time in loading heavy equipment at the rear, because the loading point is lower.

Your truck pulls a "WILLIAMS" 5-axle Trailer easier, because every wheel has big Timken bearings, and extra broad surface.

Easily stopped with load— big brakes, operated by ratchet handle of street railway type.

Mail us the coupon and get Bulletin TR-7, giving a good description of this modern trailer.

G. H. WILLIAMS COMPANY

607 Haybarger Lane, Erie, Pa.

Branch Offices:
New York, Pittsburgh, Chicago

G. H. Williams Co., Erie, Pa.

Gentlemen:

Send me Bulletin TR-7, showing how *more strength* has been built into the 5-axle WILLIAMS "Arch-Girder" Trailer *without increased weight.*

(Your Name) .....

(Company Name) .....

(Address) .....

Check below to get Bulletin 25-H, giving a description of the new Williams "Champion" Buckets.

( ) Clamshell ( ) Dragline

WILLIAMS
TRAILERS

INSLEY

N. E. C. LINES

KOEHRING
Pavers, Mixers; Power Shovels, Pull Shovels, Cranes, Draglines; Dumptors.

INSLEY
Excavators; Concrete Placing Equipment, Cars, Buckets, Derricks.

T. L. SMITH
Tilting and Non-tilting Mixers, Pavers, Weigh-Mix.

PARSONS
Trench Excavators, Backfillers.

C. H. & E.
Portable Saw Rigs, Pumps, Hoists, Material Elevators.

KWIK-MIX
Mixers: Concrete, Plaster and Mortar.

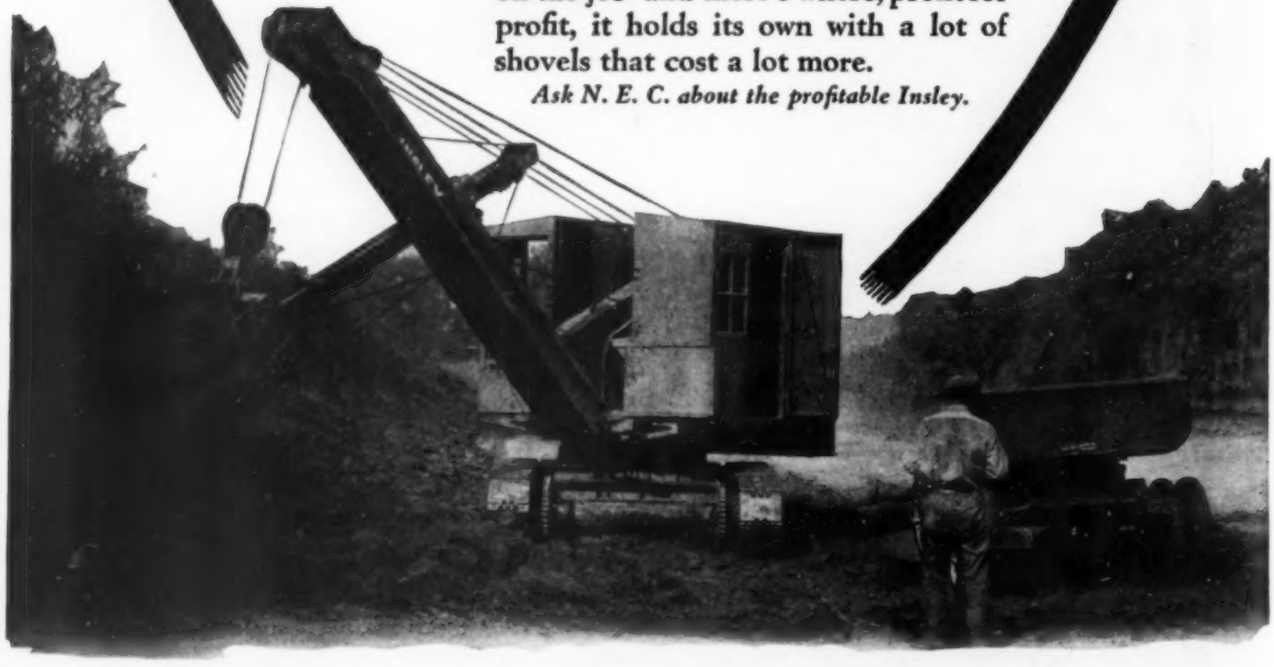
Measure It By Its Profits!

THAT'S where the Half-Yard Insley takes no back seat! It's a mighty able, profitable convertible half-yard machine — fast and capable — either as a Shovel, Crane, Dragline or Skimmer Scoop!

It's fast! Fast line speed with plenty power behind it! Fast swinging — three to four passes per minute — and it grabs a full load every trip!

Of course you can buy cheaper half-yard shovels, but the Insley is not built to that class—it's built to earn your confidence on the job and there's where, profit for profit, it holds its own with a lot of shovels that cost a lot more.

Ask N. E. C. about the profitable Insley.



National Equipment Corporation

30th St. & Concordia Ave.
Milwaukee, Wisconsin

A 5712-I

Let the Batchmeter Be the Pacemaker!

ON the automatic Koehring it controls discharge chute, charging skip and water — acts on the split second with not an instant lost between cycles!

—gives the operator time to place and spread concrete in a way to save shovelers!

Trucks hustle to meet the batchmeter pace, yet when trucks are not out of skip at warning bell, foot lever stops automatic raising of skip!

Koehring batchmeter control earns extra profits! Koehring Heavy Duty construction is the greatest profit factor you can put on the job — and now *N. E. C. service!*

Know the Koehring!

KOEHRING HEAVY DUTY

N. E. C. LINES

KOEHRING
Pavers, Mixers; Power Shovels, Pull Shovels, Cranes, Draglines; Dumptors.

INSLEY
Excavators; Concrete Placing Equipment, Cars, Buckets, Derricks.

T. L. SMITH
Tilting and Non-tilting Mixers, Pavers, Weigh-Mix.

PARSONS
Trench Excavators, Backfillers.

C. H. & E.
Portable Saw Rigs, Pumps, Hoists, Material Elevators.

KWIK-MIX
Mixers: Concrete, Plaster and Mortar.

National Equipment Corporation

30th St. & Concordia Ave.
Milwaukee, Wisconsin

A 5703-I

YOU'VE got but one brain and only sixty minutes to the hour—and details without number to oversee. Why worry yourself with the complicated job of working out a schedule of reinforcing materials and following all details in planning, delivery and checking?

You can handle the whole problem of reinforcing as a Unit Purchase—one schedule, one responsibility. We do all figuring, work out your needs on even the smallest specialties, give engineering assistance, operate on delivery dates and accept the full responsibility. Try this plan on your next contract. You'll save energy and money.

Concrete Steel Co.

EXECUTIVE OFFICES: 42 Broadway, New York

DISTRICT OFFICES—Birmingham, Boston, Chicago, Detroit, Milwaukee, Minneapolis, Philadelphia, Pittsburgh, St. Paul, Syracuse, Washington.

STEELTEX SLEEPER CHAIRS align and level sleepers automatically

1
2
3

STEELTEX For Floors

Reinforcement of *STEELTEX* is composed of a network of galvanized steel wires attached to a tough, corded-backing,—insuring proper embedment of the reinforcing mesh in the concrete slab.

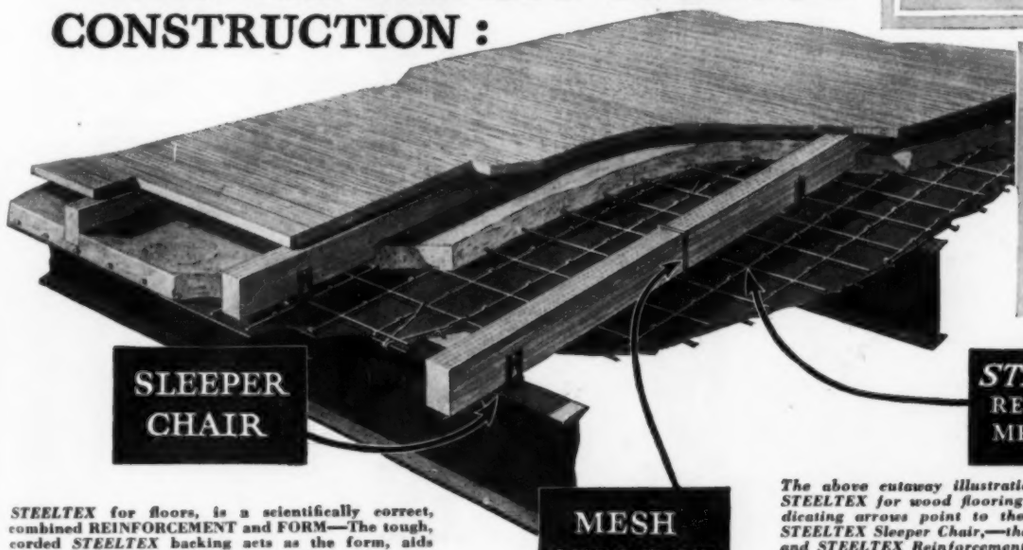
STEELTEX Sleeper Chairs

STEELTEX Sleeper Chair is used to align and level the sleepers and hold them in proper place for embedment while the concrete is poured around the sleepers.

STEELTEX Mesh Supports

STEELTEX Mesh Supports engage the wire network . . . lift and hold it so concrete flows under and around, and embeds the steel reinforcing.

A MODERN METHOD OF FLOOR CONSTRUCTION :



STEELTEX for floors, is a scientifically correct, combined REINFORCEMENT and FORM—The tough, corded *STEELTEX* backing acts as the form, aids in curing, minimizes droppings and prevents loss of concrete.

The above cutaway illustration shows the application of STEELTEX for wood flooring over concrete slabs. The indicating arrows point to the use and application of the STEELTEX Sleeper Chair,—the STEELTEX Mesh Support,—and STEELTEX Reinforcement. Where wood floors are not required, the sleepers and the STEELTEX Sleeper Chairs are omitted. Linoleum . . . tile or other floor covering is applied direct to the concrete slab.

This proved *STEELTEX* method is the modern way to build reinforced concrete slabs for wood flooring.

STEELTEX for floors,—*STEELTEX* Sleepers Chairs,—and *STEELTEX* Mesh Supports are the three *STEELTEX* units used in this modern *STEELTEX* method of floor construction. In constructing wood floors over concrete slabs, it is necessary to partly embed the sleepers in the concrete slab to prevent creaking . . . the finished flooring is nailed direct to these sleepers. To allow the concrete to flow under and around these sleepers, they are placed on, and nailed to, the *STEELTEX* Sleeper chairs. These Sleeper Chairs automatically align and level the sleepers and secure them in proper position so that they become correctly embedded in the concrete slab.

The *STEELTEX* Mesh Supports are used to engage (by hooking) the transverse wires of the *STEELTEX* reinforcing. These Mesh Supports prevent sagging without the necessity of stretching . . . and also lift and hold the *STEELTEX* wire reinforcement away from the *STEELTEX* backing so that the concrete flows freely under and around the steel wires, insuring automatic embedment of these wires in the concrete slab.

There are further details about STEELTEX for floors . . . send for FREE descriptive literature and data . . . use the coupon below

NATIONAL STEEL FABRIC COMPANY

UNION TRUST BUILDING

DIVISION OF Pittsburgh Steel Co.

PITTSBURGH, PA. U.S.A.

National Steel Fabric Company, Dept. 65-C

Gentlemen:—Please send (free) descriptive *STEELTEX* literature, for floors ☐ for roofs ☐ for interior plaster ☐ for stucco ☐ for brick and stone veneer ☐.

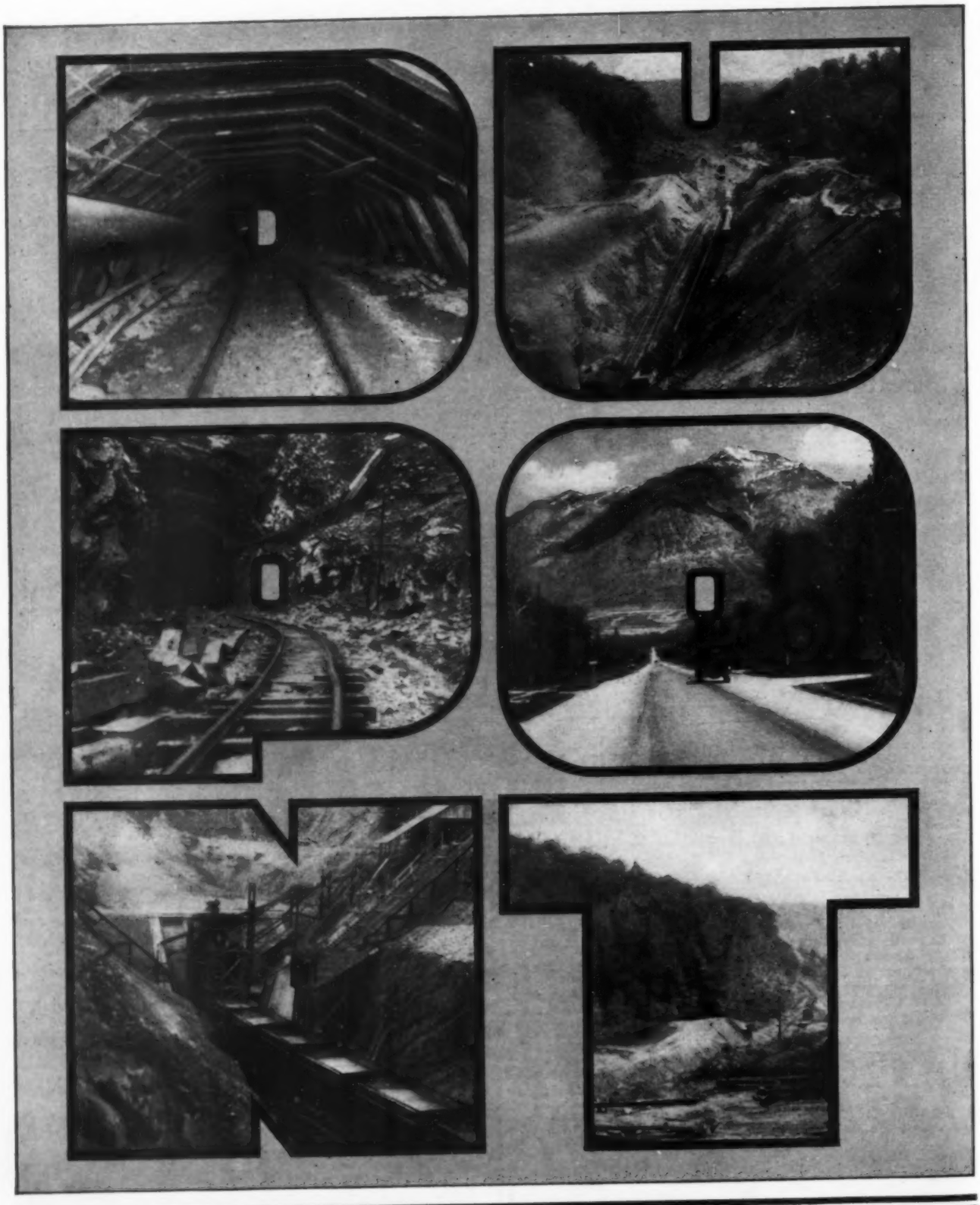
Firm Name.....

Individual's Name.....

Address .....

City..... State.....

These NEW LOW-DENSITY



GELATIN-TYPE EXPLOSIVES

Now offered by du Pont

GELEX No. 1
GELEX No. 2

THE du Pont Company has recently developed two new explosives . . . Gelex No. 1 and Gelex No. 2 . . . which will prove more economical for your use on certain work. Gelex No. 1 runs 105 cartridges, 1¼" x 8"; Gelex No. 2—120 cartridges, 1¼" x 8" . . . to the 50-lb. case.

The fumes of these new low-density explosives are better than du Pont Extra or Red Cross Extra. They have good water resistance. They are cohesive and will load well in upward pointing bore holes.

Where explosives have to remain over a longer period of time in water . . . and in badly ventilated places . . . du Pont Gelatin and du Pont Special Gelatin are recommended. But in a number of operations where a water-resistant explosive is needed but does not have to remain an excessive length of time in water . . . these new Gelexes will do the job . . . without the extra cost.

Practical solutions to your blasting problems may be found in our Explosives Service Bulletins. We shall be glad to put your name on our mailing list to receive future issues of these bulletins. Send us your request.

E. I. DU PONT DE NEMOURS & CO., INC.
Explosives Department **Wilmington, Delaware**

Some other du Pont explosives and uses to which they are adapted

Red Cross Extra Dynamite. Probably the most popular high explosive on the market. Made in strengths from 15% to 60%. One hundred and two to 106 sticks to the case. Better suited for work on soft rock, hard rock where a shattering action is not desired, and in sand, clay and earth excavation.

Du Pont Extra Dynamite. Low-density ammonia dynamite. Made in eight types, all of the same weight strength but varying in density and bulk strength. Strengths from 20% to 55%. Fumes are less objectionable than Red Cross Extra. Designed especially for blasting soft ore, soft limestone, salt, gypsum, clay and similar materials.

Durox. An ammonia dynamite of low density and high velocity. Fumes are good. Its high cartridge count . . . 160 sticks to the case . . . makes it economical to use. Suited for blasting salt, soft limestone and gypsum.

Du Pont Gelatin. Especially adapted for close work where ventilation is poor. Gives minimum of fumes. Highly water resistant. Is plastic and loads solidly in bore holes. Designed for ore mining, shaft sinking, submarine blasting, hard rock, tunnels and drifts.

Du Pont Quarry Gelatin. A type of gelatin dynamite developed especially for open work where the nature of the fumes is not important. It has same density, plasticity and water-resisting qualities as regular gelatins . . . and is stronger, grade for grade. Cannot be used in close work. Excellent for all kinds of outside work.

All above explosives are low freezing

DU PONT
REG. U.S. PAT. OFF.

The HERITAGE of a Generation of Bridge Builders

Reflected in the ROGERS Goose Neck Design

MASSIVE bridge-spans built for tremendous loads—powerful steel structures carefully computed for stress and strain—these are reflected in the design of the Rogers Gooseneck.

The development of the Gooseneck actually began in 1905, when Rogers Brothers were engaged in fabricating and erecting bridges and other steel structures.

When in 1915 they began the pioneering production of heavy-duty trailers these years of structural experience were quickly evidenced.

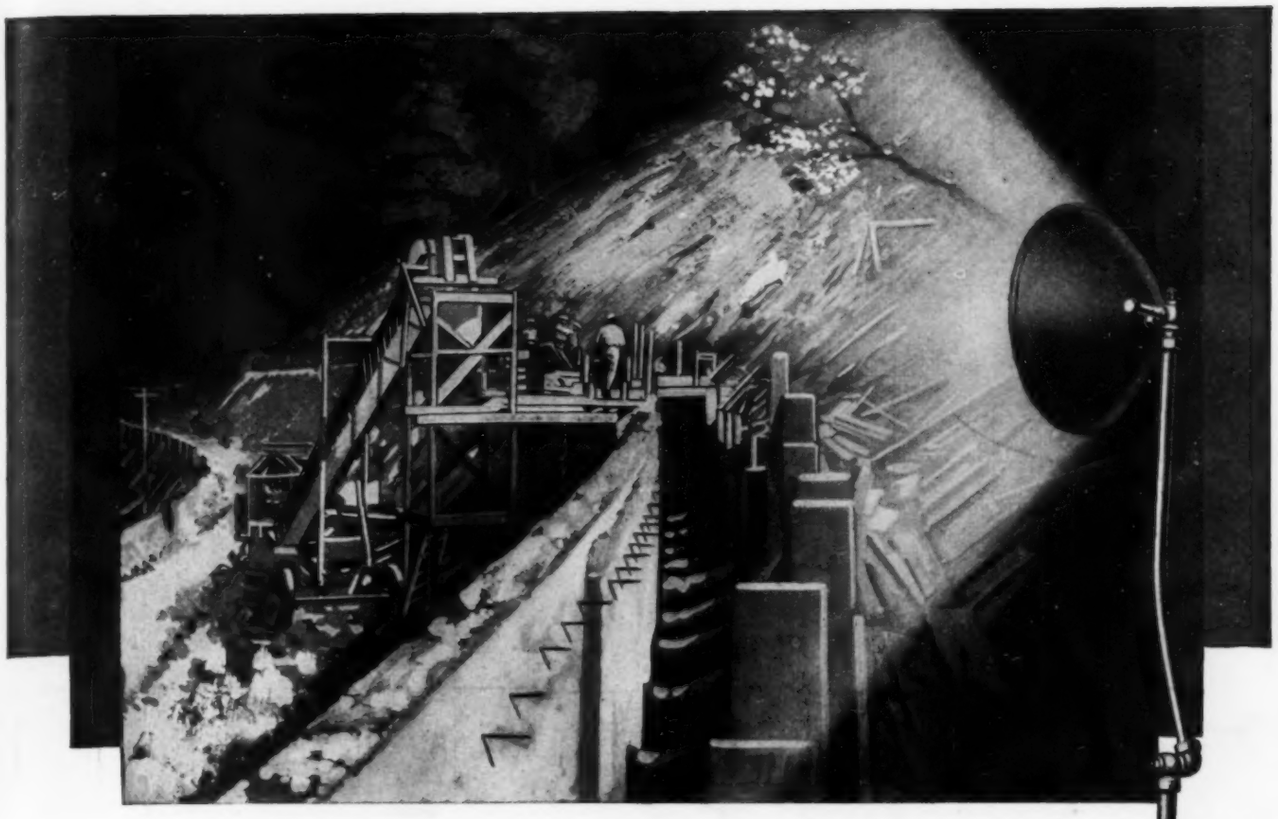
Through a number of stages, each in advance of its time, the evolution of the Gooseneck progressed, until the present highly advanced design was perfected.

This principle of design provides greater resistance to the stresses imposed by heavy hauling, than any other form of drop-frame construction yet devised.

Investigate fully this and the other distinctive features of Rogers construction—explained in Catalog No. 28—and you'll specify "Rogers" for your own needs.

ROGERS
World's Standard
HEAVY DUTY
TRAILERS

ROGERS BROTHERS CORPORATION
106 Orchard St.
ALBION, PENNA.



. . . . Carry Through With Carbic Light . . .

WHEN late starts, unfavorable weather, lack of materials, or any other cause of delay forces you to rush the job along—a night shift with Carbic Flood Lights will see you through.

Carbic Flood Lights enable your night shift to work rapidly and safely. Their powerful, clear white rays are perfectly diffused. There is no glare and no dark shadow. Carbic Light penetrates fog, smoke or dust. It is good light to work by.

Carbic Flood Lights are low in first cost and economical to operate. They are simple, rugged and dependable—and meet every night-illuminating requirement.

Your night shift can hustle with Carbic Light.

Carbic is distributed by the Union Carbide Sales Company through its national chain of warehouses and is sold by jobbers everywhere.

CARBIC

PROCESSED CARBIDE FOR CARBIC LIGHTS & GENERATORS

OXWELD ACETYLENE COMPANY

Unit of Union Carbide UCC *and Carbon Corporation*

NEW YORK

Sales offices in principal cities

In Canada: Dominion Oxygen Co., Ltd., Toronto

Technical Publicity Department, Room 1201, 205 East 42nd Street, New York, N. Y. CM 4-30

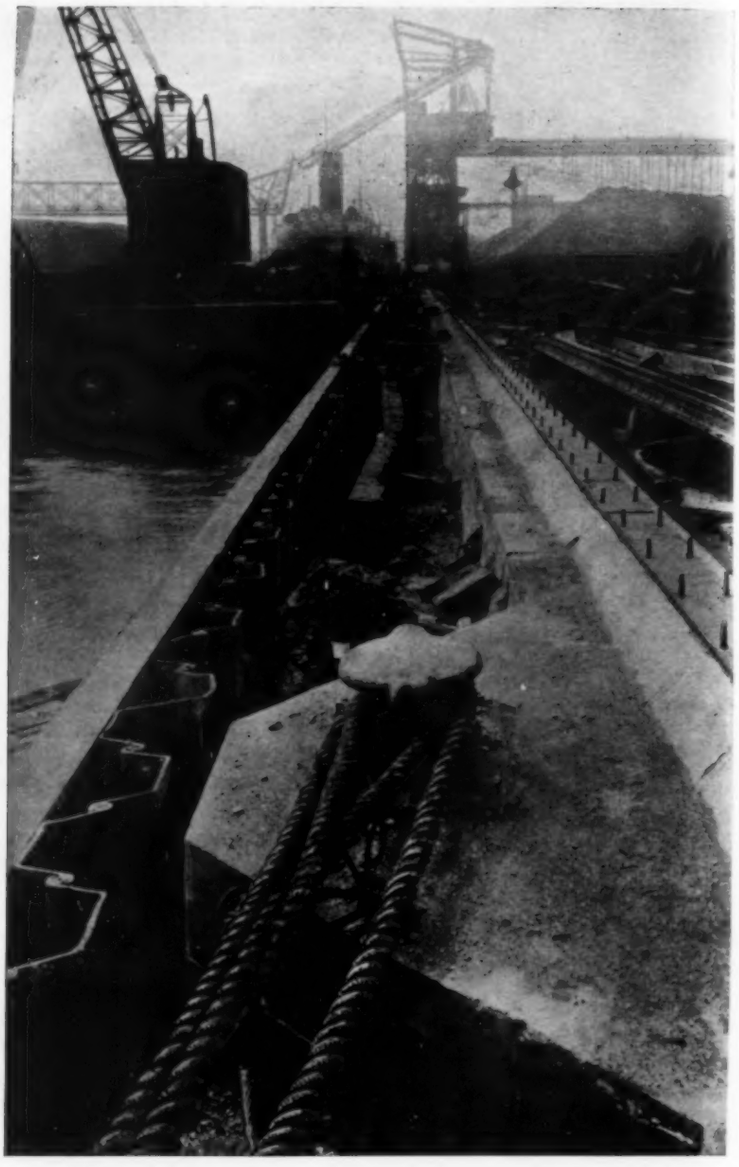
Without obligation, I would like to have additional information on Carbic Lights.

Name _____

Street Address _____

City _____ *State* _____

LACKAWANNA Deep-Arch PILING in COAL DOCK Milwaukee, Wis.



Lackawanna Deep-Arch Piling, Section No. D P 165, in 32-foot lengths, was used in the construction of the coal dock shown above. The steel-sheet piling was driven through soft clay. The depth of the water after dredging was 21 feet.

Lackawanna Deep-Arch Piling, due to its great transverse strength, is especially well suited for use in structures of this type. Its use permits a structure of simpler design, with resultant economy in materials and construction costs.

Edward E. Gillen Company, Milwaukee, Wis., Contractors.

BETHLEHEM STEEL COMPANY

General Offices: Bethlehem, Pa.

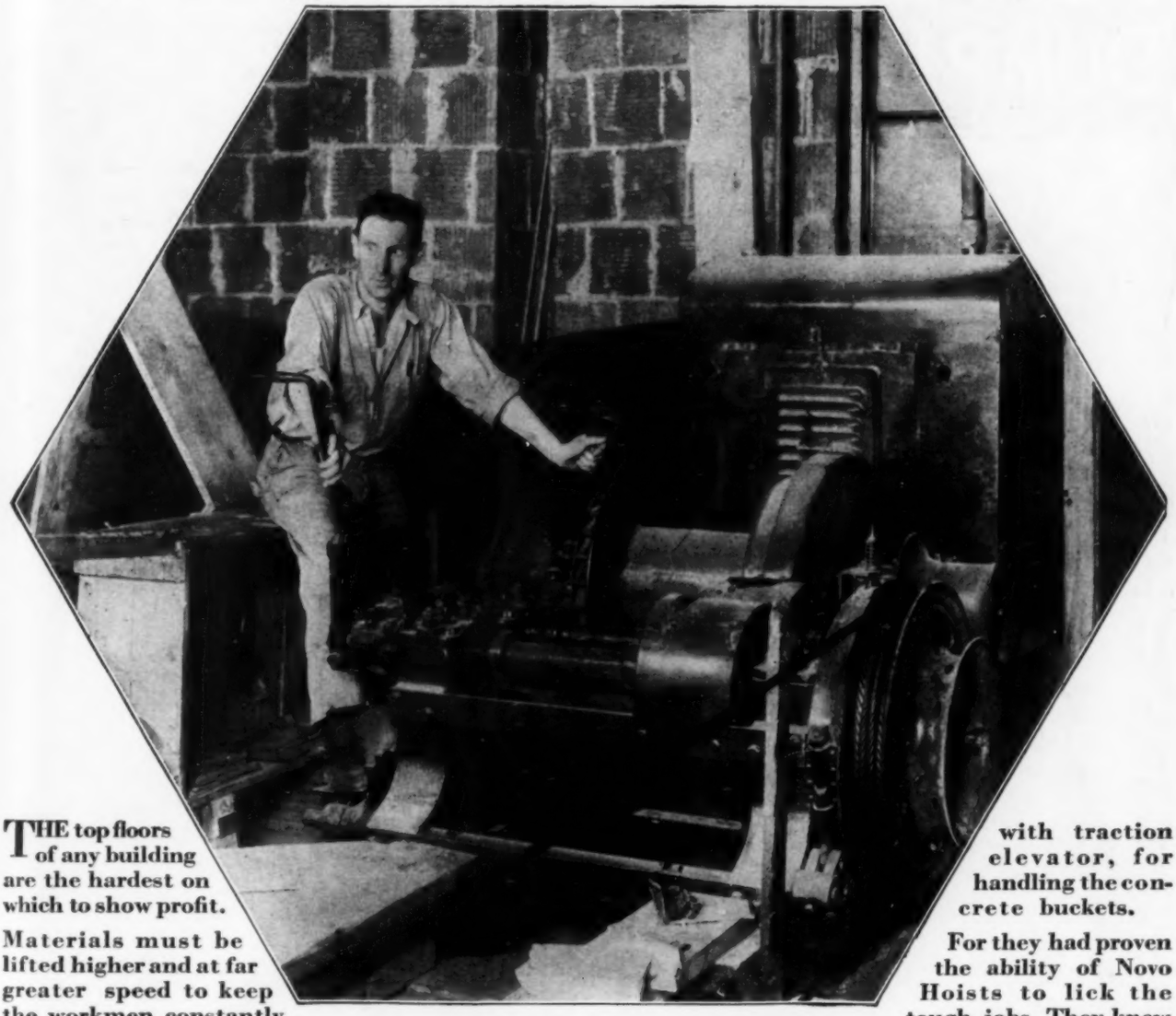
District Offices: New York, Boston, Philadelphia, Baltimore, Washington, Atlanta, Buffalo, Pittsburgh, Cleveland, Cincinnati, Detroit, Chicago, St. Louis.

Pacific Coast Distributor: Pacific Coast Steel Corporation, San Francisco, Los Angeles, Seattle, Portland, Honolulu.

Export Distributor: Bethlehem Steel Export Corporation, 25 Broadway, New York City.

BETHLEHEM

When The Job Got Tough They Called In This Novo



THE top floors of any building are the hardest on which to show profit.

Materials must be lifted higher and at far greater speed to keep the workmen constantly supplied.

So, when the McDonald Construction Company was called in to finish the last three floors—386 feet above the ground—on the new Civil Courts Building, St. Louis, their first move was to install a Novo Hoist with traction elevator, for handling the concrete buckets.

For they had proven the ability of Novo Hoists to lick the tough jobs. They knew Novo's "steam throttle" control, speed, overpower and rigid construction—that means dependability and low costs from the first floor to the last.

It will pay you to see what Novo Hoists can do for you. Send the coupon.

The Novo Hoisting Handbook details jobs like the above to help solve your problems. Send the coupon for your copy today.

NOVO
PUMPS—ENGINES—HOISTS

Please send me the Novo Hoisting Handbook.

Name .....

Address .....

NOVO ENGINE COMPANY
214 Porter Street - Lansing, Michigan
Clarence E. Bement, Vice-Pres. and Gen. Mgr.

City .....

State .....

PERFECTION DUMP BODIES

PERFECTION
again leads with this
NEW DROPSIDE COMBINATION DUMP BODY

MAY be used as tightly closed dump body for sand, lime or similar materials, or with sides let down, forms a platform truck more than seven feet wide for hauling long timbers, pipe, etc. Collapsible stakes do not interfere with the loading when closed. Equipped with Hand, Gravity, Combination and Mechanical Hoists.

SEND THE COUPON *or write for further information on this new, fast-selling Perfection item.*

THE PERFECTION STEEL BODY CO.
Dept. C.M.
GALION · OHIO · U. S. A.

PERFECTION DUMP BODIES

The Perfection Steel Body Co., Galion, Ohio, Dept. C.M.
I am interested in further information on the New Perfection Drop Side Dump Body.

NAME .....
CITY .....
STATE .....

THE RIGHT TOOL SAVES TIME

FOR BETTER CONCRETE WORK

Here is a tool designed especially for cement contractors and those engaged in the building of concrete walls, walks and drives. Shank and handle are offset from plane of blade so that it can be pushed down flush with the side of the form. This brings fine concrete toward the form and insures a smooth surface, after form is removed. Improves the appearance and makes a more satisfactory job. Saves time over a makeshift tool not designed for this work.

Blade is 7" wide, slotted. Handle—selected ash.

The brand True Temper is burned in the handle to mark each tamper as the best tool of its kind that can be made.

THE AMERICAN FORK & HOE CO.
1901 Keith Bldg.,
CLEVELAND, OHIO
Makers of Farm and Garden Tools for over 100 years.

If your dealer has not yet stocked the Concrete Tamper, Cat. No. 7CT, send us his name and $1.60 and we will supply you direct, postpaid.

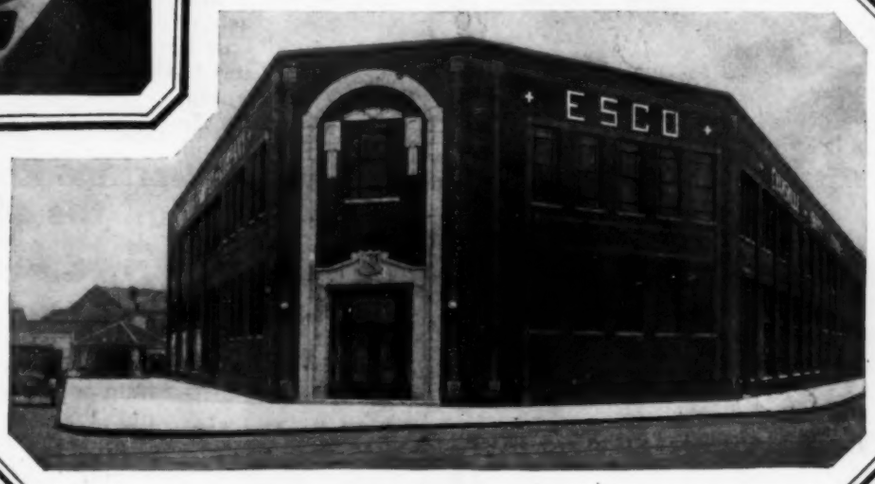
Concrete Tamper

FREE
on Request
Heavy Steel Goods or Industrial Tool Catalog. Describes over 50 tools for mill, mine, factory and coal yard.

TRUE TEMPER TOOLS

TALK NUMBER FOUR BY A PROMINENT DISTRIBUTOR

"THINK—

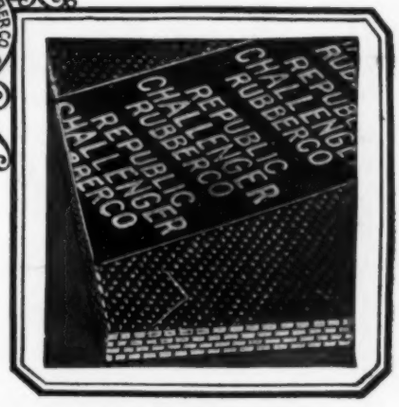


Above—Mr. F. J. Hofacker, General Manager of the Evansville Supply Company of Evansville, Indiana. This company's services are of a definite economic value to the prosperity of its business territory.

THINK of the economic waste to consumers of Industrial Supplies if they had to interview all the salesmen of all the manufacturers who make materials they use. They couldn't do it, and even if manufacturers had a sales force large enough to make the calls it would make the prices prohibitive.

We do that for our field which makes us an economic necessity—which makes our recommendations worth while, and we recommend Republic's Belting—Hose—Packing—Molded and Lathe Cut Goods."

The above statement is characteristic of those made by prominent distributors all over the country. It explains in part how the Industrial Supply Distributor, helping to solve the important problem of broad markets and *economical* distribution, upholds high quality, maintains fair prices and saves needless efforts on the part of both consumer and manufacturer.



Challenger Transmission Belting—a square edged belt without seams to open up—with body sufficient to hold belt fasteners—with very little stretch and a gripping power that reduces power losses caused by slippage.

Recommended for heavy or troublesome drives.

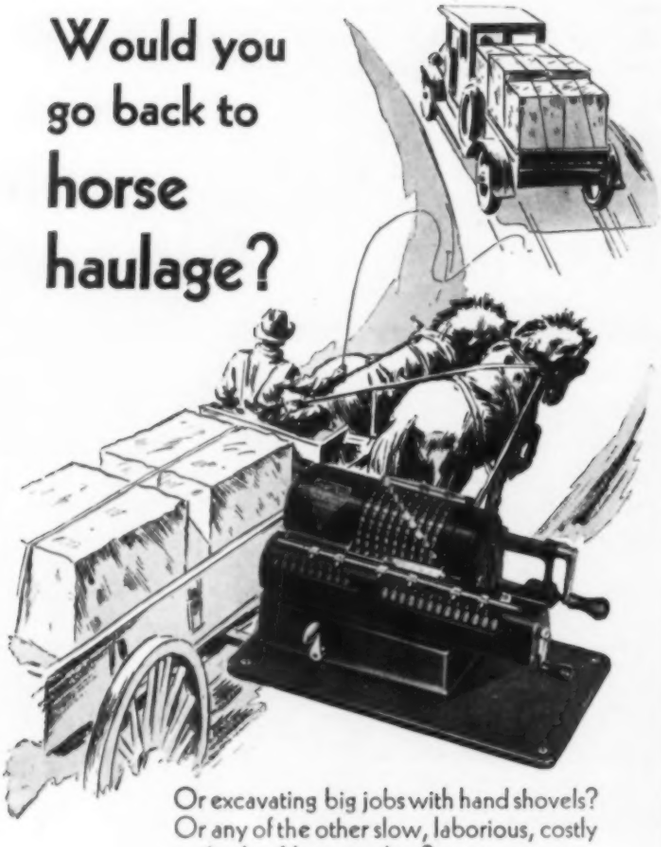
Write for a sample

THE REPUBLIC RUBBER CO.

Youngstown Ohio

REPUBLIC means the Best Mechanical Rubber Goods

Would you go back to horse haulage?



Or excavating big jobs with hand shovels? Or any of the other slow, laborious, costly methods of bygone days?

Then why stick to antiquated *figuring?*

Let the *mechanical* brain of the Marchant Portable Calculator do all your figuring for you . . . with absolute accuracy, in far less time, and without brain fag.

MARCHANT PORTABLE *Calculator* $125

Adds
Subtracts
Multiplies
Divides

Figures any problem. Always right, no checking back. Much faster than a slide rule and has far greater capacity.

Portable, compact. Can be used out on the job or in the office. Anyone can run it.

Sold under the standard Marchant guarantee. Terms if desired.

Bring your figuring up to date. Mail the coupon NOW!

17 years building calculators, nothing else. Sales and service offices the world over.

Free! **Marchant Calculating Machine Co.**
Dept. 130, Oakland, California

Please send me full information about
☐ Marchant All-Electric ☐ $125 Marchant Portable

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DIXON brings to construction all the advantages of GRAPHITE

For the Joseph Dixon Crucible Company sees an obligation in its service to the construction industry. And through incorporating the basic advantages of natural flake graphite in its Graphite Products, fulfill this obligation.

The graphite used in all Dixon Graphite Products is a natural flake graphite which in purity, in uniformity, in lubricating and protecting qualities has never been equalled.

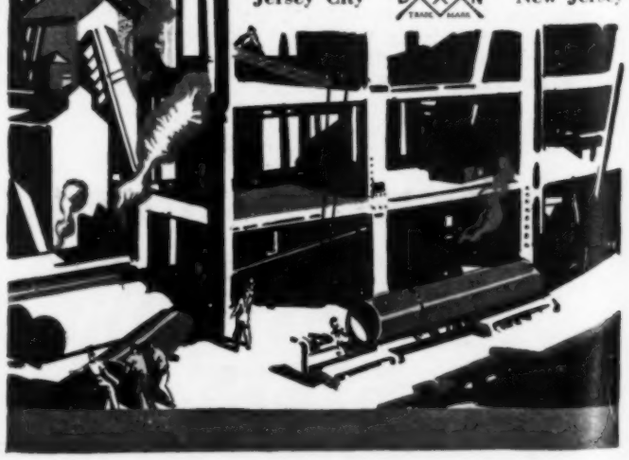
In Dixon's Graphite Products, the construction industry finds an answer to many of its difficult lubrication problems. Write for Booklet No. 86KP.

DIXON'S GRAPHITE PRODUCTS

Flake Graphite
Graphite Cup Grease
Waterproof Graphite Grease
Pipe Joint Compound
Graphite Seal
Industrial Graphite Paint

Joseph Dixon Crucible Co.

Jersey City D X N **New Jersey**



Chosen In CHOSEN

Not only at home but in far away CHOSEN (Korea) are M-W AIR KING Portables selected for doing the big air compressor jobs in construction work.

Above is pictured a gang of Chinese laborers using a 210 cu.ft. AIR KING "TOW-ABOUT" to operate two rock drills in the construction of the Kankyo Railway in North Korea, Asia.

The engineers on this job selected AIR KINGS because of their unfailing dependability on out-of-the-way projects where parts and repairs are next to impossible to obtain.

AIR KINGS are in everyday use in all parts of the world—from China and Japan to South America and other foreign countries.

* * *

AIR KINGS—embodying such exclusive features as Heavy Duty Industrial Engines with 25% reserve power, "Feather" Valves, Forced Feed Lubrication, All-Welded Steel Frame—are made in 28, 110, 220, 280 and 330 cu.ft. sizes—on Towabout, Tractor and Railcar mountings.

Complete Catalog on Request.

METALWELD, INC., 26TH AND HUNTING PARK AVE., PHILA.

Dealers in Principal Cities

METALWELD-WORTHINGTON

PORTABLE AIR COMPRESSORS

The

Timber Wolf

Portable Sawing Machine

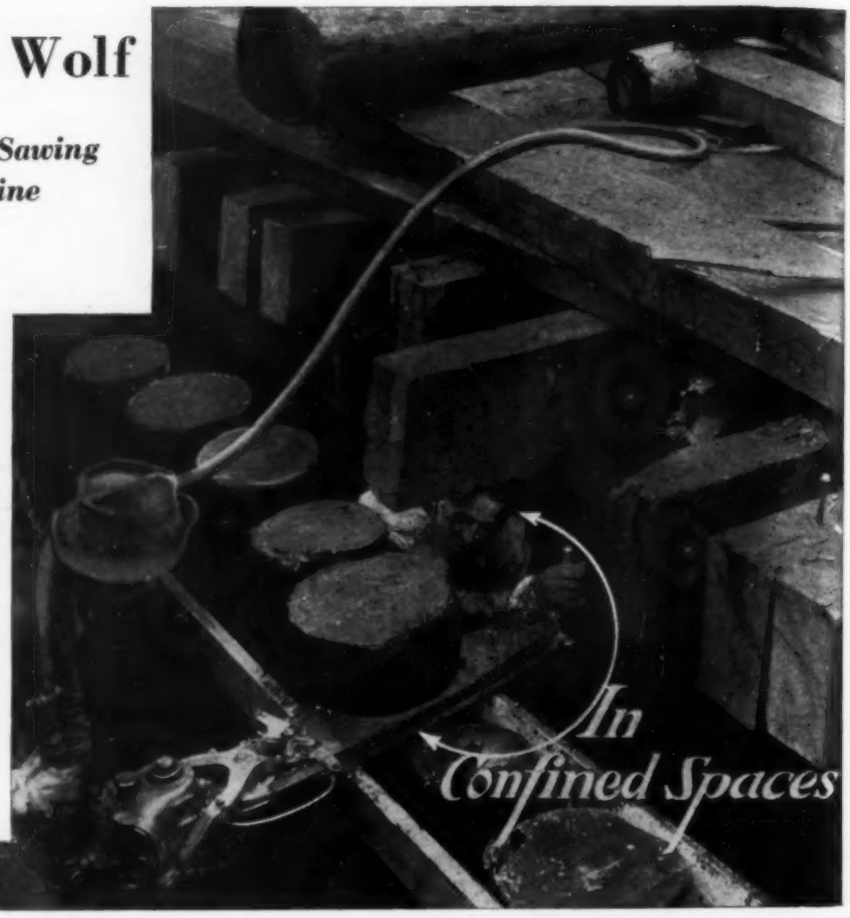
No Stroke Room . . . .

And yet, the Timber Wolf cuts through timber after timber—5 times as fast as hand-sawing—tireless, powerful, labor saving.

Every construction field has been quick to see its value—Railroad, Mining, Marine, General Construction, Federal and Local Government Departments.

Available with A.C. or D.C. drive, or with compressed air for under water service. Write for complete details.

REED-PRENTICE CORPORATION
WORCESTER, MASS., U. S. A.



YOU NEED A WARCO FOR A JOB LIKE THIS

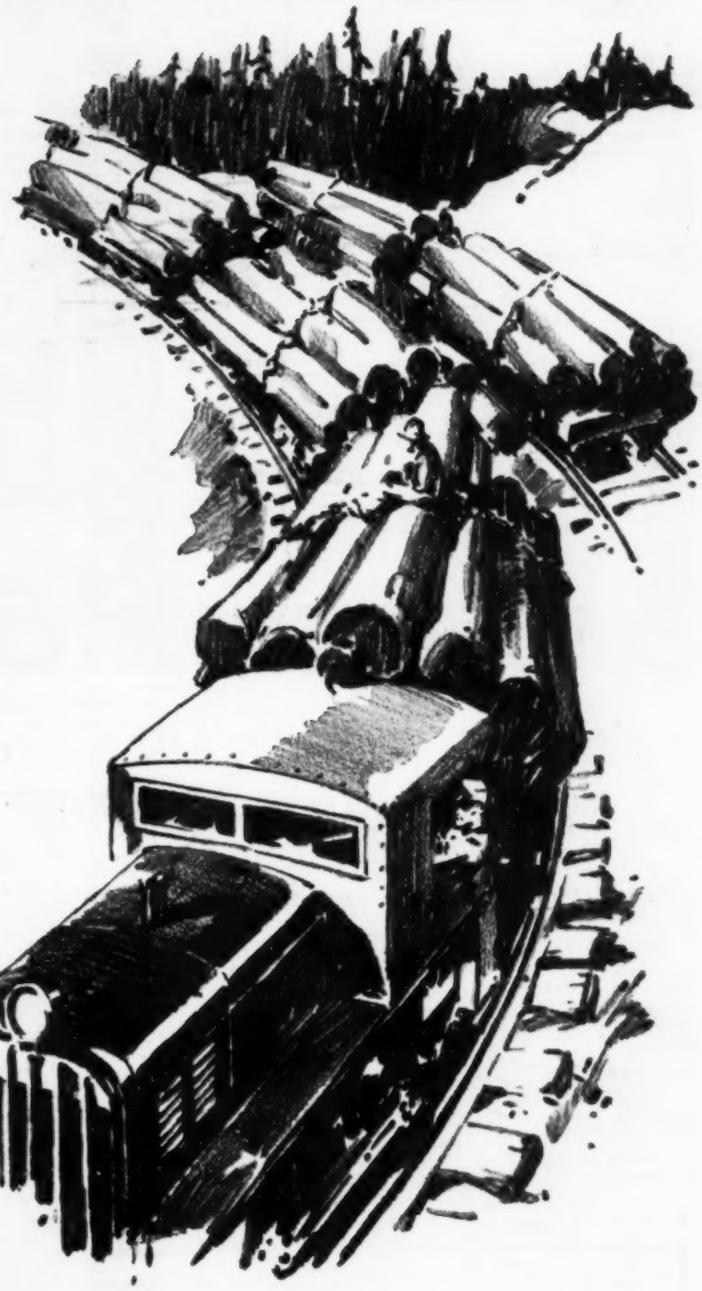
WARCO power graders in either center or rear control, and with WARCO rear-type crawlers (interchangeable with rear tractor wheels) handle the most difficult types of road building and maintenance. Snow plow, bulldozer and independent scarifier attachments make them year round machines.

Power and Drawn Graders—Wheeled Scoops
Rear-Type Crawlers for Tractors

W. A. RIDDELL COMPANY
Bucyrus, Ohio

This WARCO Model 15 (center control) "Road-Hog" power grader with WARCO rear-type crawlers is working on the County roads of Berkley County, West Virginia. It is cutting a shale-like formation that was never previously worked without blasting.

Hercules Power an Aid to Modern Logging

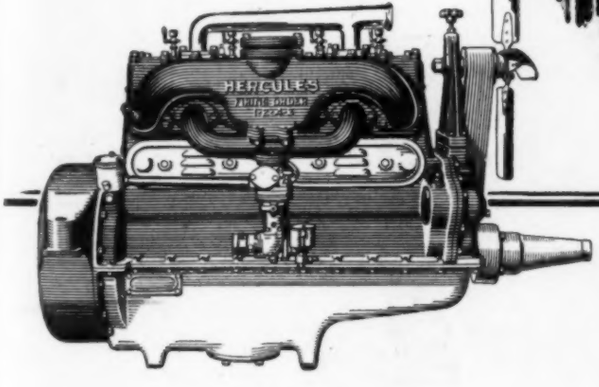


STEEL rails are replacing waterways in modern logging. Millions of feet of timber are hauled out each year by sturdy Hercules-Powered Vulcan locomotives. Many other industries, too, have found Hercules-Equipped locomotives invaluable. In quarries, in lime and gravel plants, on construction work and in private freight yards, locomotives powered by Hercules move materials quickly and at lowest cost.

Whether powering heavy locomotives and giant shovels or operating portable pumps and compressors, Hercules Engines are reliable and economical in service. Built in a complete range of sizes, from 13 to 115 H.P., they are standard equipment on a wide variety of heavy-duty industrial machinery.

HERCULES MOTORS CORPORATION
Canton, Ohio, U. S. A.

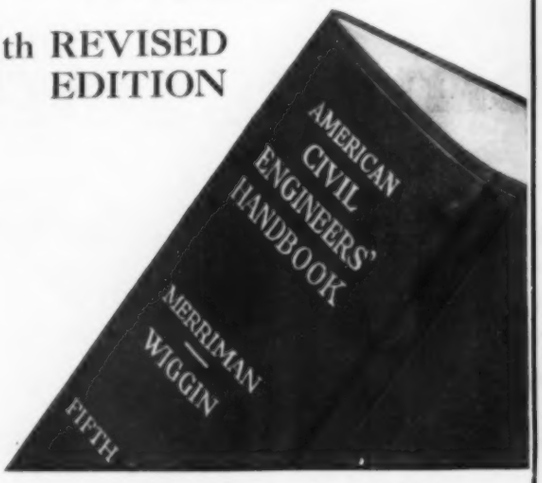
WEST COAST BRANCH: LOS ANGELES, CAL.
MID-CONTINENT BRANCH: TULSA, OKLA.



HERCULES ENGINES

Now Ready!

5th REVISED EDITION



MERRIMAN'S
American Civil Engineers'
HANDBOOK

A complete and thorough revision has been made of this world-famous Handbook. A group of 20 distinguished specialists headed by Thaddeus Merriman and Thomas H. Wiggin has been at work for over 26 months revising, rewriting, and bringing all data completely down to date. The finished volume represents, therefore, civil engineering as it is practiced today by the leaders in the profession.

The price of the "Handbook" is $8.00 for the single-volume edition bound in Atholeather, and $10.00 for the two-volume edition bound in genuine leather—truly a remarkable buy for 2263 pages of up-to-the-minute information written by men of recognized reputation.

The NEW "Merriman"

Mathematical Tables; Mathematics and Mechanics; Chemistry, Physics, Meteorology, Weights and Measures; Steam Engineering; Electrical Engineering; Surveying, Geodesy, Railroad Location; Materials of Construction; Foundations and Earthwork; Timber Structures; Masonry Structures; Plain and Reinforced Concrete; Steel Structures; Hydraulics, Pumping, Water Power; Water Supply; Dams, Aqueducts, Canals, Shafts, Tunnels; Irrigation and Drainage; Sewerage and Sewerage Disposal; Refuse Collection and Disposal; Harbor and River Works; Highway Engineering; Steam Railroads; Electric Railroads.

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Gentlemen: Please send me Merriman's "Handbook" on ten days' approval. (☐ Single-volume edition, $8.00. ☐ Two-volume edition, $10.00). *(Check which.)* I agree to remit the price of the book within 10 days or return it postpaid.

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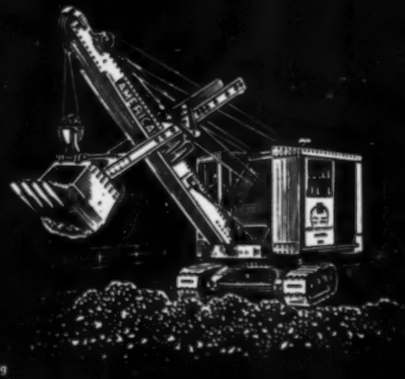
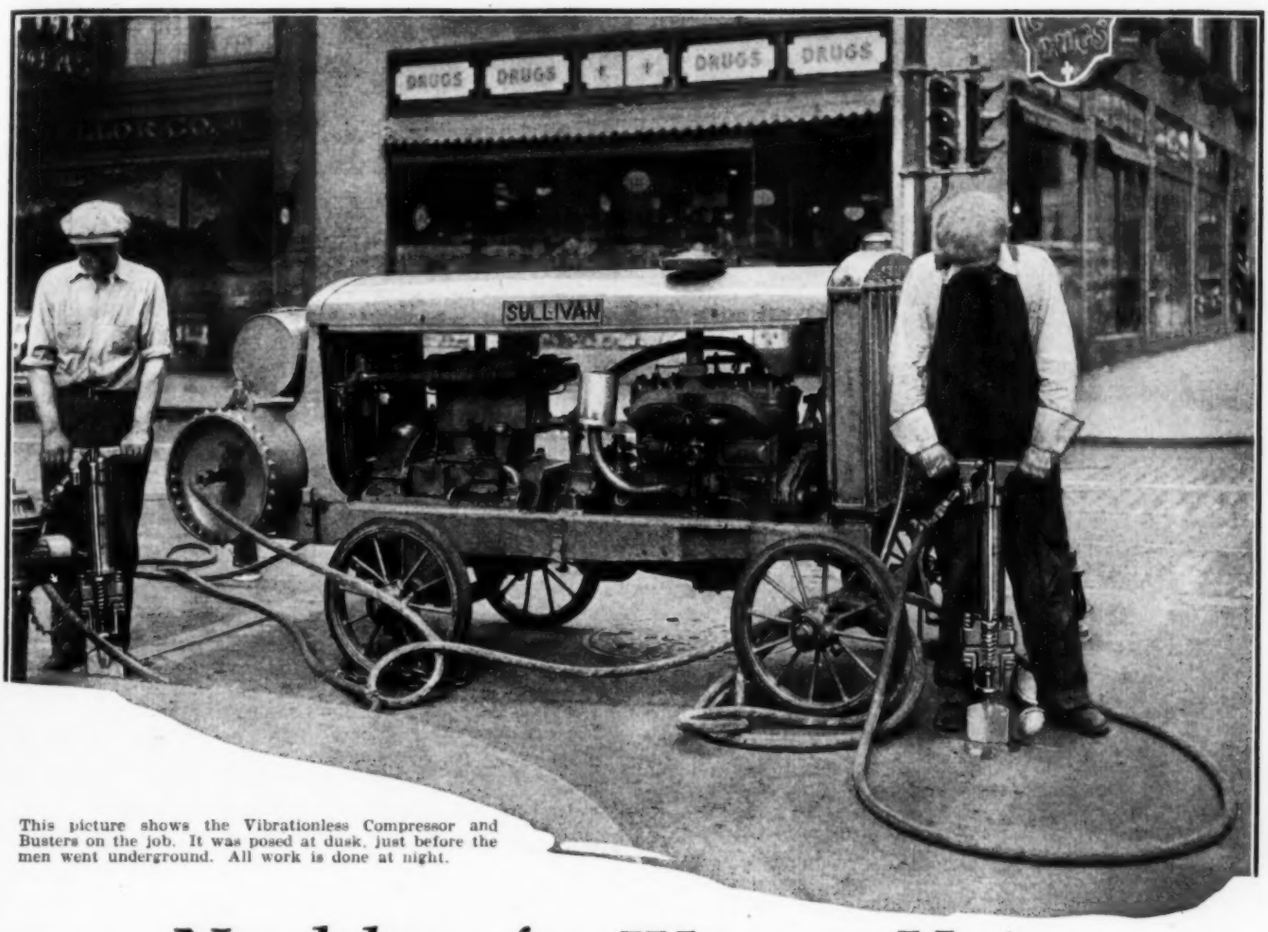
The AMERICAN
GOPHER
SHOVEL

Fast, strong in every part, embodying all proved features; the "GOPHER" is the kind of shovel the experienced shovel user would build if he had the know-how and equipment to build the kind of shovel his long experience tells him he needs.



Quality Engineering

AMERICAN
HOIST & DERRICK CO.
Saint Paul, Minnesota



This picture shows the Vibrationless Compressor and Busters on the job. It was posed at dusk, just before the men went underground. All work is done at night.

No delays for Western Union

Small tunneling jobs, and a lot of them, is the construction program of the Western Union Telegraph Company. Sullivan Busters and Sullivan Spaders are always busy extending conduit, under streets.

And a crowded schedule for a large group of cities is handled by a single air compressor — a Sullivan "Vibrationless." Photographers traced the outfit from New York, to Jersey City, to Buffalo, back to New York, and then to Pittsburgh, before they got the picture at the top of the page. Since then the equipment has been used in Wheeling and Clarksburg, West Virginia.

The Sullivan Vibrationless Compressor stays on the job—keeps work moving—completes contracts sooner —increasing your earnings on all equipment.

Why not send for Catalog 83-R?

SULLIVAN AIR POWER EQUIPMENT

SULLIVAN MACHINERY COMPANY

816 Wrigley Bldg., CHICAGO

Offices in all principal cities of the world

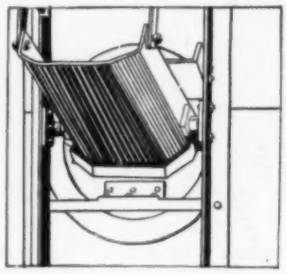
A Lop-Sided Load Makes A Good Mixer Die Young

Built in all sizes to and including 56-S.

In mixing position, the Knickerbocker discharge chute extends inside the drum, acting as a baffle-plate, moving the mixture to the middle of the drum, producing the transverse mixing action recommended by engineers. Keeping it outside the drum would allow the material to pile up on the discharge side, causing excessive wear on drum track, trunnions and rollers on that side.

Under the chute is a slop-guard —that means larger batch capacity in spite of large discharge opening.

In discharge position the wide, half-round chute is steep—it empties the drum quickly. That means more batches per hour.



Do you want to sacrifice these advantages in order to save 20 to 40 pounds in weight, $12.00 to $20.00 in first cost?

Our new catalog is full of pertinent mixer information! Ask for a copy.

***The* KNICKERBOCKER COMPANY**
Jackson **Michigan**

308

BAKER

Earth Moving Equipment

Built For Long Service and Better Performance

***Baker Maney Scrapers*—The original self-loading scrapers, in 1½, 1 and ¾ cu. yd. capacities, continue to hold the lead as practical tractor scrapers for hauls up to 1000 feet.**

***Baker Rotary Scrapers*—One man automatic scrapers for short haul jobs. Built in capacities of 13 to 40 cu. ft. for any tractor.**

***Baker Bulldozers*—Hydraulic—"floating" blade—high lift—for Monarch or Caterpillar Tractors. Hand-operated models for light tractors.**

Send for descriptive bulletins on above Baker products.

The Baker Mfg. Co., 568 Stanford Ave., Springfield, Ill.

Baker Maney Self-Loading 4-Wheel Scrapers.

Bulldozer

Rotary Scraper

WEHR

Announces a complete line of Pull-Type Graders

In keeping with its past policy of building the world's finest line of power graders, Wehr now announces a complete line of horse and tractor-drawn graders. . . . Wehr Pull-Type Graders will embody all that the name Wehr implies. . . . They will be well engineered, well constructed, and their standards of performance will be all that is usually expected of graders bearing the name, Wehr. . . . Regardless of what your grader requirements may be they can be met completely by the Wehr distributor. . . . Upon request we will send you complete literature describing the Wehr.

WEHR COMPANY
MILWAUKEE, WIS.
Factory—CUDAHY, WIS.

WEHR
ROAD BUILDING AND MAINTENANCE EQUIPMENT

Modern, simplified methods of proportioning concrete mixture

This new book supplies the construction engineer with definite data and tested principles by which to rate his material in order to get the most practical result and meet building requirements.

Basic Principles of Concrete Making

By FRANKLIN B. McMILLAN
Director of Research, Portland Cement Association
with an introduction by
F. E. SCHMITT,
Editor, Engineering News-Record

99 pages, 6x9 inches
32 illustrations and tables
$2.00 postpaid

PRACTICALLY the entire book is devoted to a discussion of the factors of concrete and how the engineer can control the quality of his concrete through these factors.

The material included in this volume was gained from long experience and observation of successful construction work, together with exhaustive laboratory tests. The information is presented in a direct and concise form so that it is immediately available to the practicing engineer.

Some of the important topics covered are:

—how strength, watertightness and durability of concrete are obtained, and defects avoided.

—types of concrete to be desired for various construction job requirements.

—quality of materials and their effects on the finished work.

—types of concrete and proportions affecting these types.

—selection of materials; placing; testing.

See this book for 10 days FREE!

We will be glad to send this book to you for 10 days' free examination. Put it to an actual working test before you decide to buy it. Simply fill in and mail the coupon below.

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You may send me for 10 days' free examination a copy of McMillan's **Basic Principles of Concrete Making**, $2.00. At the end of that time I agree to remit for the book or return it postpaid.

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To insure prompt shipment write plainly and fill in all lines.
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It's the burner with the covered top that insures continuous service—"The harder it blows the better it burns"

Fuel consumption is cut in two.

Wick consumption practically eliminated—we guarantee our standard 18-in. wick to give constant satisfactory service for a whole year.

The Toledo Torch is the ideal safety light - unbreakable, self-righting, theft-proof.

The Economy Burner

And on no other torch will you find this all-important burner in such an efficient form.

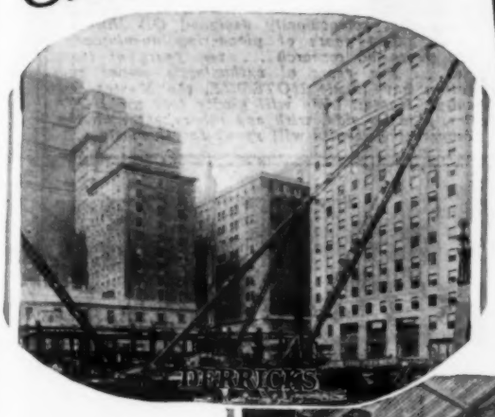
Look for our name embossed on the bowl of every genuine Toledo Torch.

Write for circulars and prices if your dealer can't supply you.

TPS The Toledo Pressed Steel Co.
TOLEDO OHIO
Save with Steel

Manufacturers of the Toledo Folding Steel Horse — the ideal Highway barricade.

Contractors Prefer Electric Equipment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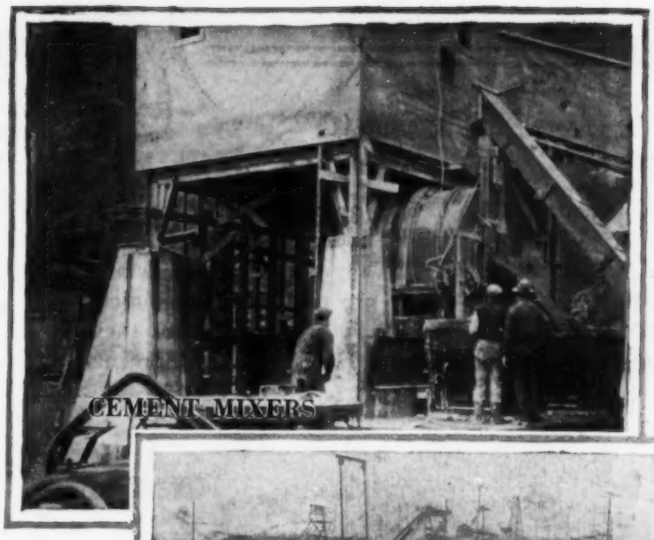
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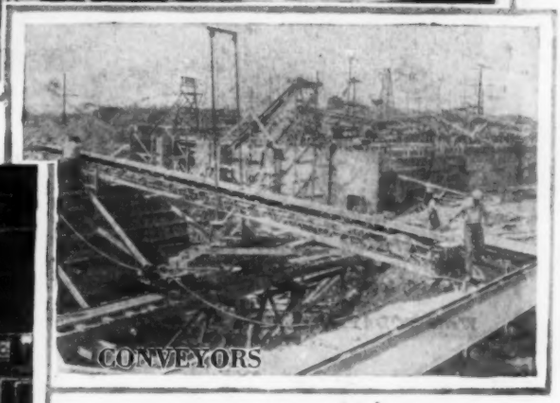
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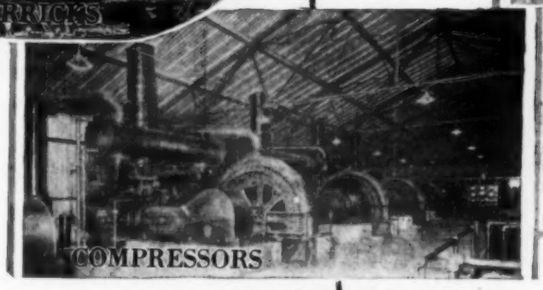
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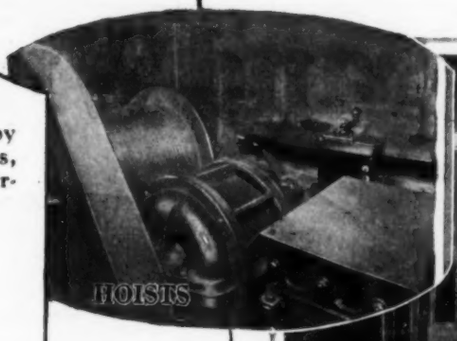
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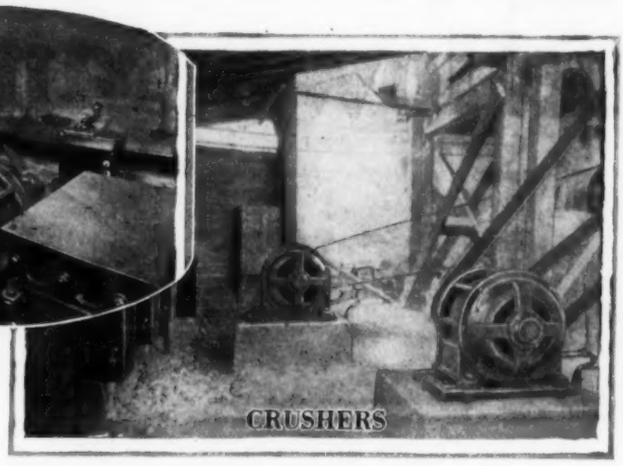
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These reasons were given by representative contractors, queried in a nation-wide survey:

- Economy
- Few repairs
- Low upkeep
- High salvage value
- Dependability
- Best for cold-weather work
- Breakdowns minimized
- No smoke or soot
- No handling of fuel or ashes
- Reduced fire hazard
- Convenience
- Ease of handling and operating
- Compactness
- Flexibility
- Noiseless
- No water lines

THERE is a G-E motor and control suited to every power requirement in the building construction field. Write, or call, the nearest G-E office for information on G-E Motorized Power.

Motorized Power
–fitted to every need

200-339

GENERAL ELECTRIC

GENERAL ELECTRIC COMPANY, SALES AND SERVICE IN PRINCIPAL CITIES

"Under Estimated"

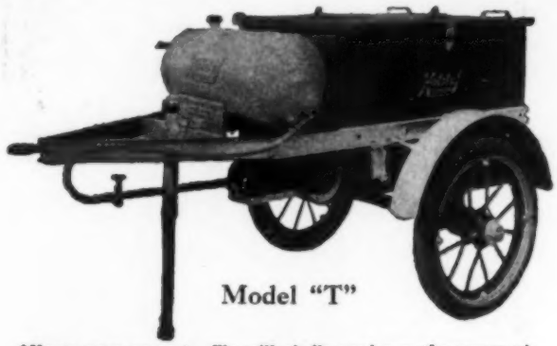
Hotstuf
TRADE MARK

Our modest claim of 30% greater melting capacity with 30% less fuel is underestimated. That's exactly what one HOTSTUF user* wrote us. Many other HOTSTUF users are of the same opinion. Hundreds of enthusiastic users write us of their absolute satisfaction with HOTSTUF Equipment.

There are now, and have been in the past few years, several attempts at imitating the HOTSTUF Patented Elevated Melting Chamber Principle. The HOTSTUF Asphalt Heater was the first scientifically designed Oil Burning Asphalt Heater. Ten years of pioneering development work.....ten years of research.....ten years of time tested results.....ten years of enthusiastic owner and user satisfaction have made HOTSTUF, the Master Oil Burning Asphalt Heater. We will gladly test the HOTSTUF Heater, side by side, with any other heater on the market. Comparative results will speak for themselves.

The Mohawk Hi-Speed TRAILER TOOL BOX gives you speed, security and strength. No more loss of tools by theft. No more lifting or lugging.

Write TODAY for Bulletin No. 12. It tells an interesting story.



Model "T"

*Name upon request. We will gladly send you the names of satisfied owners in your locality.

Mohawk Asphalt Heater Co., 62 Weaver St. Schenectady, N. Y.

Yellow Strand Wire Rope

Avoid Risks!

Life and property — profit or loss — often depend upon a cable's stamina. The same amazing resilience that makes Yellow Strand Rope safe, makes it last — makes its actual cost low.

Laid up from specially drawn steel wire from Swedish stock unrivalled for *uniformly* high quality. Write for Catalog 47.

BRODERICK & BASCOM ROPE CO. ST. LOUIS

New York Seattle Portland Houston

N 842

NO TIPPING
NO ROCKING
EASILY OILED and GREASED
BOOM DIRECTLY over Roller Path
MEANS MORE YARDAGE

—and more yardage means
LONGER PROFITS

EXCESSIVE profits are strangers to the contractor in these days of close bidding, but you can make *longer profits* through *greater yardage* by putting the BAY-CITY Model K to work.

Model K is a light ½ yard full revolving shovel, convertible to crane, dragline, skimmer and trench hoe. Short tailswing permits working in close quarters. Independent friction clutches on each separate crawler makes it possible to turn around in minimum space.

The 8-in. center pin and the 6 foot roller path, equaling or exceeding similar parts on one yard machines, plus the mounting of the base of the boom less than 30-in. from the center pin, reduces rocking or tipping to an absolute minimum and mechanically balances the machine. This also enables the Model K to handle the same size buckets and same length booms that are used on machines three to five tons heavier—meaning economy and greater yardage with the flexibility and efficiency of a light ½ yard machine.

Investigate the Model K . . . Write us for further information or the name of our nearest distributor.

MODEL R
A 26-ton, heavy duty, full revolving ¾-yd. shovel, crane or dragline.

MODEL K
Full revolving light ½-yd. convertible shovel. Weighs 14½ tons.

TRACTOR SHOVEL
Recognized leader in its field. Operates shovel, Trench hoe, backfiller, etc. Weighs 10 tons.

BAY CITY SHOVELS, Inc.

New York Office—302 Broadway BAY CITY, MICH.

BAY-CITY SHOVELS

THE BAY-CITY FAMILY OF FAST WORKERS

Lectro molded BOOT

An entirely new and more practical boot for excavation work

●

Molded in one piece like an automobile tire

Short Height

Storm King Height

Also made in Sporting Height

The Lectro Molded Boot is built by an entirely new patented method that produces the toughest, longest wearing and most comfortable fitting boot ever designed. Under terrific pressure the boot is molded in one piece so compact and solid that it will stand more grinding, cutting, and hard wear than any ordinary rubber boot.

Lectro Molded Boots are made only by the Hood Rubber Company, Inc., who manufacture a complete line of quality rubber footwear for all industrial uses.

If your supply house cannot supply you with Lectro Molded Boots write to the Hood Rubber Company, Inc., Watertown, Mass. Without any obligation at all we will gladly mail you a folder which fully describes the interesting features of this new product.

The Lectro Molded Boot is patented and made only by

HOOD RUBBER COMPANY, INC.

Watertown, Mass.

HOOD MAKES CANVAS SHOES · RUBBER FOOTWEAR · TIRES
RUBBER SOLES AND HEELS · RUBBER FLOOR TILING

C7

PAVING BREAKER

PUNCH!

"Two men and your machine are now doing more work in a day than twelve men formerly did by hand." Thus writes a Cleveland Paving Breaker user.

This performance is not unusual. We have performance reports even more remarkable. The speed, power and punch of the new Cleveland C7 Paving Breaker place it in a class by itself.

Let us demonstrate this unusual tool. Write.

CLEVALOY

Special manufacturing process retains the correct flow lines in Clevaloy Steels. They outlast at least two ordinary tools. Try them.

The Cleveland Rock Drill Co.

3734 E. 78th St., Cleveland, Ohio

Distributors in 111 Cities in the United States have parts in stock for immediate service.

CLEVELAND ROCK DRILLS

FOR HEAVY HAULING -- the "CATERPILLAR" TRACTOR

BEACH SAND!—here the wide tracks of the "Caterpillar" prove their supremacy! Power and traction in nice balance assure that bulky, heavy loads will be spotted with no loss of time. A friendly hand to laden trucks—and all this after the same "Caterpillar" has leveled the site and bulldozed the sand around the foundation piers. The picture shows a 16-ton load of steel at the Ford Motor Company's Long Beach (California) plant.

Prices—f. o. b. Peoria, Illinois

TEN	$1100	TWENTY	$1900
FIFTEEN	$1450	THIRTY	$2375
	SIXTY	$4175	

Caterpillar Tractor Co.

PEORIA, ILL. *and* SAN LEANDRO, CALIF., U. S. A.

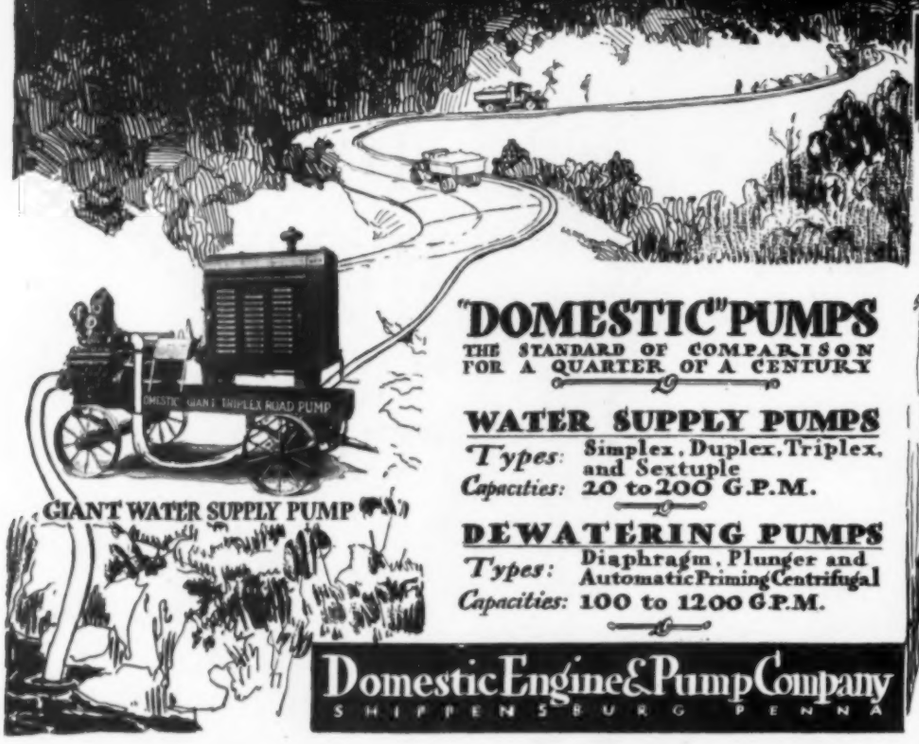
Track-type Tractors Combines Road Machinery

(There's a "Caterpillar" Dealer Near You)

CATERPILLAR
REG. U.S. PAT. OFF.
TRACTOR

"DOMESTIC" PUMPS *for* CONTRACTORS

Their Use Means SAFETY SPEED *and* PROFITS



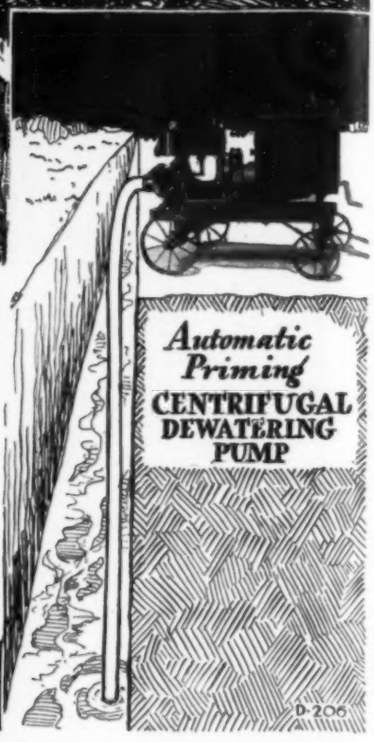
GIANT WATER SUPPLY PUMP

"DOMESTIC" PUMPS
THE STANDARD OF COMPARISON FOR A QUARTER OF A CENTURY

WATER SUPPLY PUMPS
Types: Simplex, Duplex, Triplex, and Sextuple
Capacities: 20 to 200 G.P.M.

DEWATERING PUMPS
Types: Diaphragm, Plunger and Automatic Priming Centrifugal
Capacities: 100 to 1200 G.P.M.

Domestic Engine & Pump Company
SHIPPENSBURG PENNA



The UNIVERSAL SAND TESTER

This little instrument will tell you whether your sand is good or poor *before* you use it, and give you the facts with a permanent record, quickly and cheaply.

It can be used in the laboratory, at the sand bank or on the job.
Send for booklet "About Sand."

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Sole Manufacturers
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Please Write on your Business Stationery
KOLESCH & CO., 138 Fulton St., New York City
Send me your Booklet "About Sand" and put my name down gratis, for future literature.
Name .....
Company .....
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Another WAPPAT *triumph*

Prominent Pittsburgh Contractor saved $2,500.00 per year using a WAPPAT Electric Handsaw for cutting concrete forms. Based on using saws three hours per day, they paid for themselves the first twenty-five days. Write for catalog "S."

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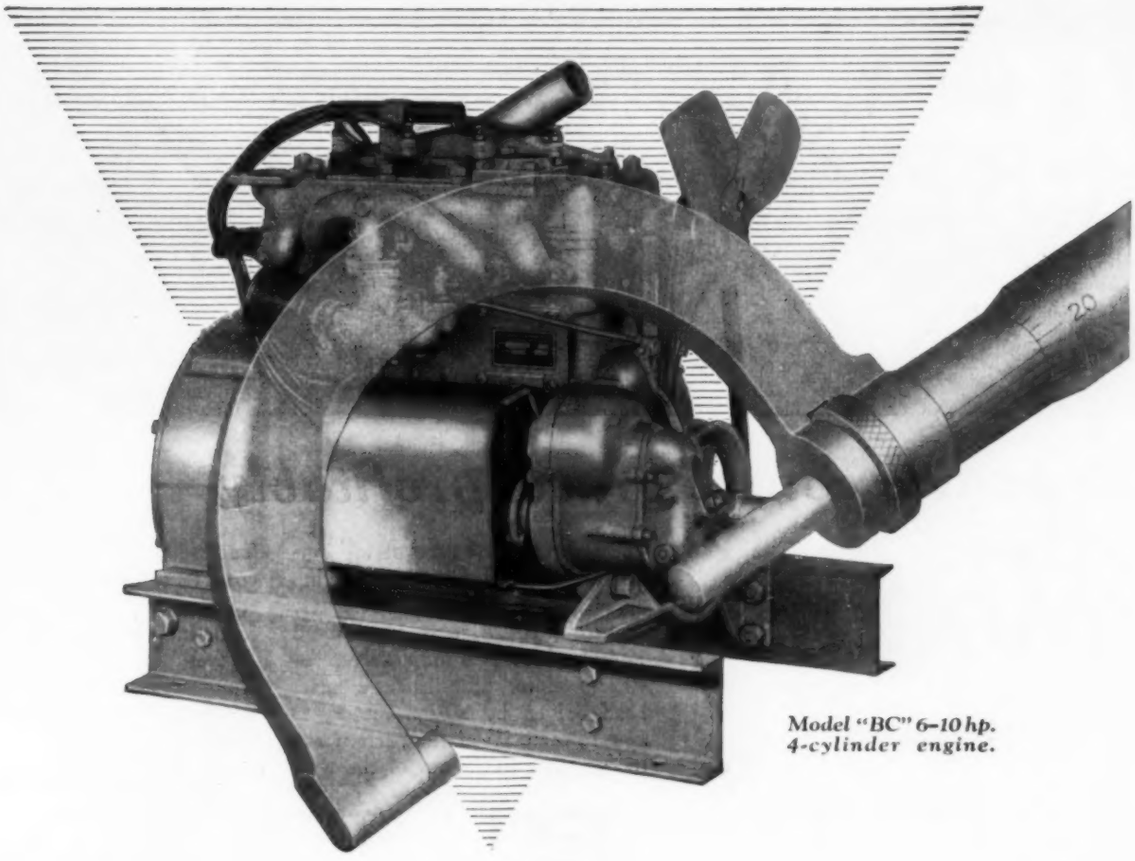
Division of Simonds Saw and Steel Co.



Model "BC" 6–10 hp. 4-cylinder engine.

PRECISION WORKMANSHIP

THE FIRST STEP TOWARD LONGER LIFE

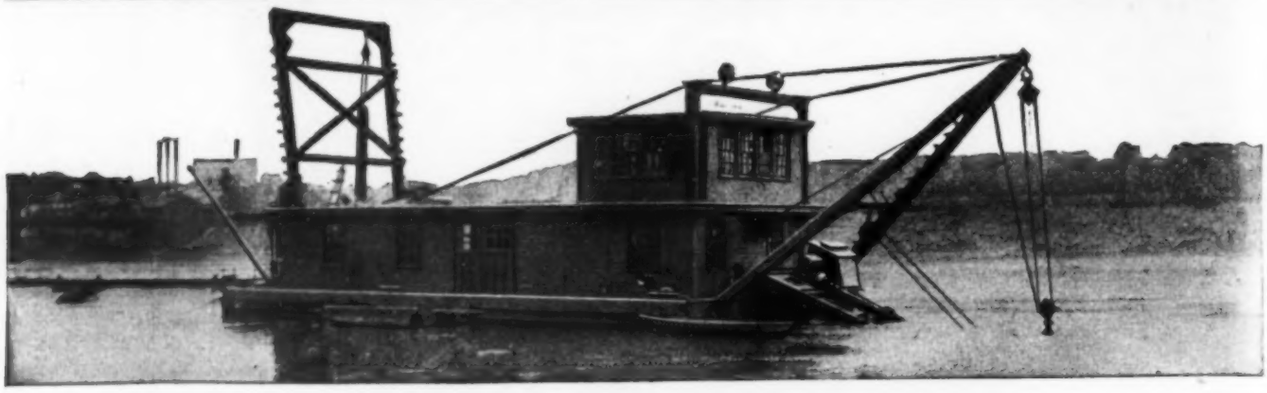
Precision workmanship and rigid inspection are essential to successful engine building and are outstanding requisites in the production of Fuller & Johnson engines. In our factory every engine part from crank shaft to cylinder head is accurately measured and fitted by thoroughly trained mechanics so that perfect balance and performance are assured.

And in both design and construction FULLER & JOHNSON engines are well fitted to withstand the gruelling service to which construction machinery is subjected. Rugged strength and smooth performance, which have always characterized FULLER & JOHNSON engines, make them the preferred power unit for all types of industrial and construction work. It pays to specify them.

Complete details of the engine illustrated—or other FULLER & JOHNSON power units — sent on request. Write Fuller & Johnson Manufacturing Company, manufacturers of single and multi-cylinder—air and water cooled—horizontal and vertical engines, in various sizes. Address: 40 Coma Street, Madison, Wisconsin.

FULLER & JOHNSON

ENGINE SPECIALISTS ESTABLISHED 1840



To handle coarse gravel profitably—

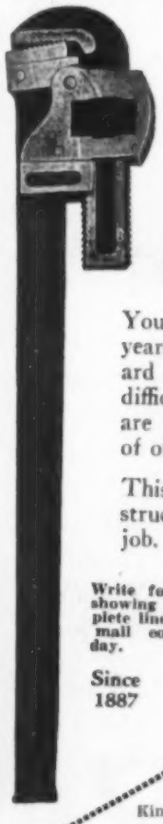
MORRIS
CENTRIFUGAL PUMPS

Morris Machine Works
Baldwinsville, N. Y.
Branches in principal cities

THE value of a revolving cutter head, even when picking up loose heavy gravel is definitely proven by this dredge, which has a 12-inch Morris Pump driven by 400-hp. motor, and utilizes a cutter head driven by 20-hp. motor, to agitate material at the suction and to get large stones out of the way.

Less than 5 per cent of gravel and sand operations handle such heavy, coarse and abrasive gravel, so a cutter in combination with a Morris Pump can be depended upon to minimize interruptions and increase capacity under any average or severe operating conditions where the material contains obstructions or is compacted in the bed.

If you want faster, cheaper, more dependable production, let Morris Engineers suggest the right pumping equipment. Ask for Bulletin.



Small or

LARGE
Standard Pipe Wrenches

You contractors knew this tool some years ago as the Genuine Oswego Standard Wrench. You know its "rep" for difficult work. As made by us, all parts are interchangeable with similar parts of other makes of this wrench.

This is a fine investment for keen construction men, for all sorts of jobs on the job.

Write for catalog showing our complete line, use and mail coupon today.

Since 1887

Mail Today!

Yes, you may quote us on Oswego Standard Pipe Wrenches in all sizes. And send the Oswego Catalog.

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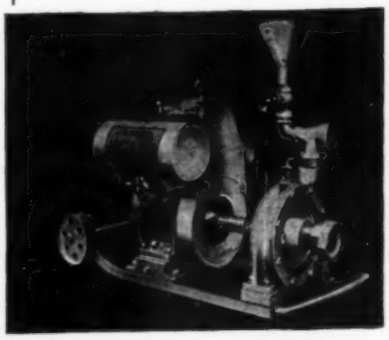
B-903 THE OSWEGO TOOL CO., Oswego, N. Y.

A rugged, sturdy pump, yet 1 man handles it easily.



$167.50 buys 8,000 Gal. *Speed Boy* Pump

Jaeger builds all types–sizes

YOU won't buy as much pump elsewhere under $200, or as compact and portable a pump anywhere. Pumps 8500 gallons at 20 ft. head, handles 25% to 28% solids, won't clog or stick, weighs about 200 lbs.

Has 2 h. p., 4 cycle Briggs & Stratton air cooled engine, non-rusting brass impeller, easy primer attachment, foot starter, foot valve. One of a complete line of sizes and types.

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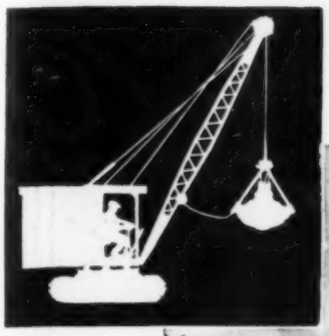
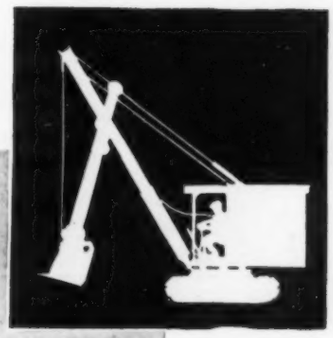
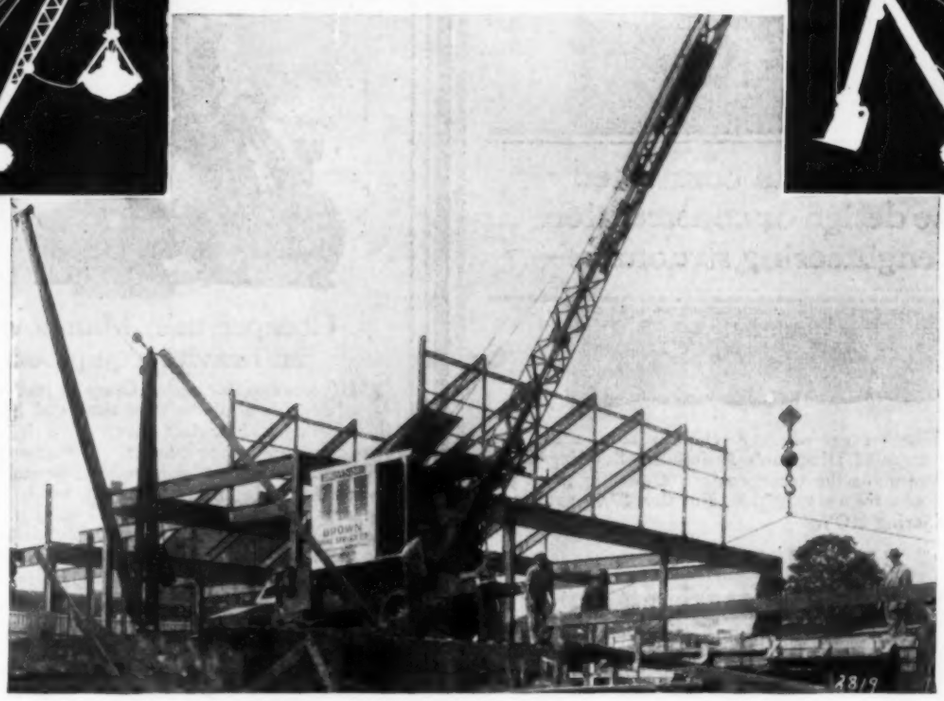
THE JAEGER MACHINE CO.
800 Dublin Ave., Columbus, Ohio



A Browning Truck Crane erecting steelwork on the new post office building in Orange, N. J.





A Browning Truck Crane will lop hours off your handling time—both getting to the job and getting the job done. It is as mobile as a truck and does the work of a dozen men. You will get more productive work done with a Browning—the facts prove it. Let us tell you all about them.

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Branch Offices: **New York, N. Y., Chicago, Ill.**

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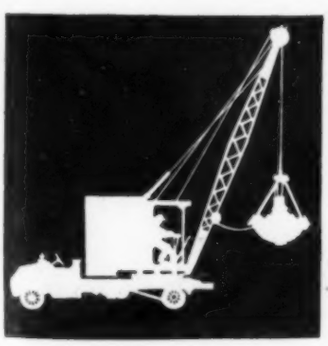

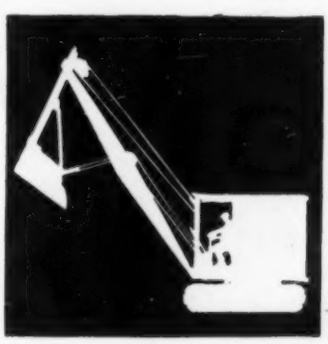

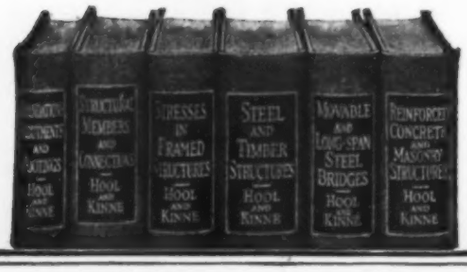

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You Can Rely on the "GROUNDHOG"

Revolving Tractor Scraper for fast, sure, trouble-free work on any dirt moving job.

Road Grading—Municipal Air Port Construction—Golf Course Building—Real Estate Developments—Excavating Work—Parks—Fills—and General Leveling Operations.

Works fast—the depth of cut is always under control—loads and spreads—or dumps, under forward draft. The ideal equipment for the busy contractor.

No.	*Width*	*Capacity*
4A	4 ft	3/5 yd.
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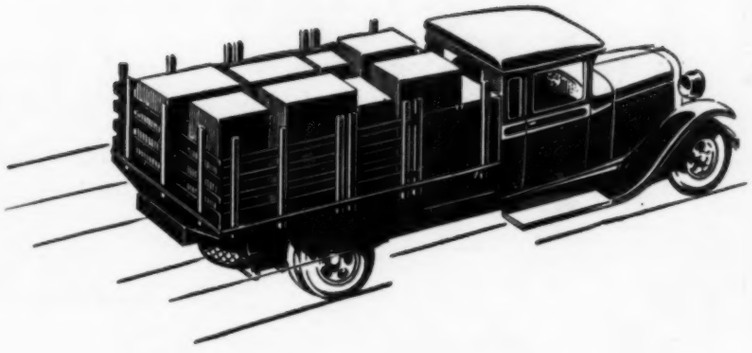
THE RODERICK LEAN CO.
Dept. CM; MANSFIELD, OHIO

More profit per load hauled



There is a compelling reason for the universal use of Dodge Trucks—a compelling reason why thousands of contractors use them—a compelling reason why one will be a profitable investment for you . . . These workers haul at low cost and therefore increase the profits of their owners.

How Dodge Trucks lower hauling costs is noonday clear to users. They are speedy in get-away and on the open road—they are time-savers. They are dependable—work faithfully with the minimum of time off and minimum need for upkeep. They serve at low cost and serve long. They are good-looking—goodwill builders. They please drivers by their comfort and performance—increase driver efficiency.

For proof that a Dodge Truck will lower your hauling costs, see your Dodge Brothers dealer. Inspect the type that fits your needs. Buy it complete with body. Count on greater savings per load hauled, greater profit.

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IN INDIANAPOLIS

A wet steel sheeted job. Twenty feet deep. Fifteen feet of water. Old pumping methods. A progress sheet that no one was proud of.

A tip. A little thought. An order. A delivery. A Two-Pump Moretrench Wellpoint System. An installation with the usual result.

NOW—A Western Union Message.

From—Indianapolis, Indiana, March 26, 1930

To—Moore Trench Machine Company
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"I wish to advise you that Price Brothers job was completely dewatered in three hours after pumps started. Contractors are more than satisfied with results obtained. Conditions on job such that they can now lay as much pipe in one day as they previously laid in twelve days when using steel sheeting."

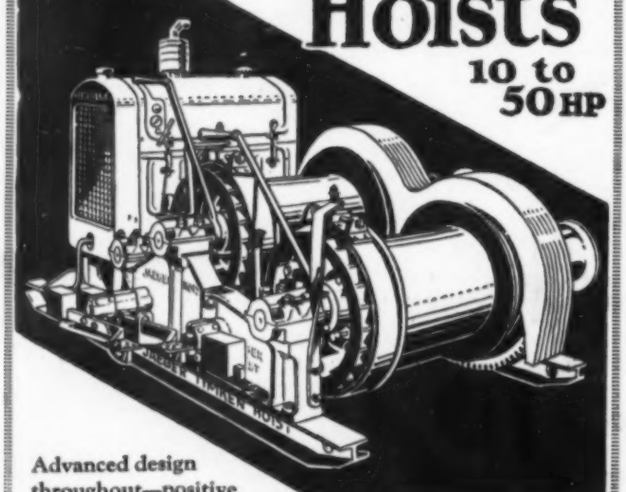
John McNeilly.

The Moretrench Wellpoint System makes every job a dry job.
Does it pay? Ask us before you start.

MOORE TRENCH MACHINE COMPANY, Rockaway, New Jersey

Jaeger Timken Screw Thrust Hoists

10 to 50 HP



Advanced design throughout—positive drum release, (no springs), moulded asbestos friction blocks, silent chain drive, etc. Single or double, gas or electric. *New low prices. Send for catalog.*

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"FLOR-OX" 15-25
CONTRACTORS' HOIST

This NEW "FLOR-OX" is marked by smoothness of operation, utmost dependability and extreme ruggedness of construction. It has the same outstanding features as the "FLOR-OX" 35-50.

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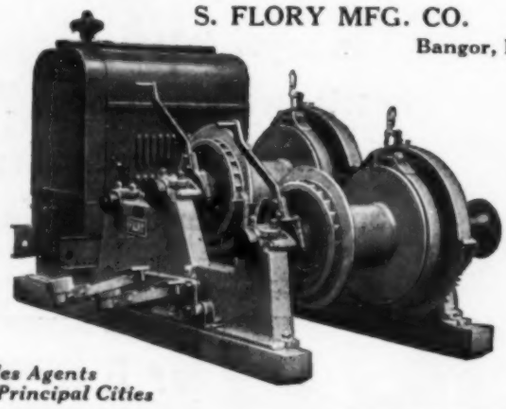

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THE 1930 MULTI FOOTE PAVER

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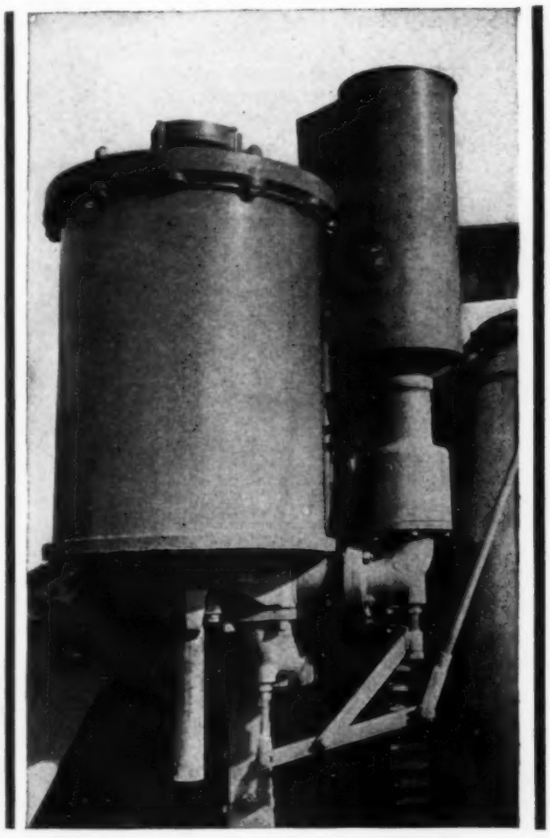

For 1930 Equipment MultiFoote has created a New, No-Pressure Water Tank.

The Measuring Tank, the accuracy of which is not affected by water pressure, condition of grade or air in the supply line, is filled from an open top Auxiliary Supply Tank controlled by a Float valve.

This Equipment relieves the operating valves from that constant wear resulting from operating under pressure. MultiFoote offers to the paving contractor an advanced improvement which will be evident as each day's yardage is completed.

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THE FOOTE CO., Inc.
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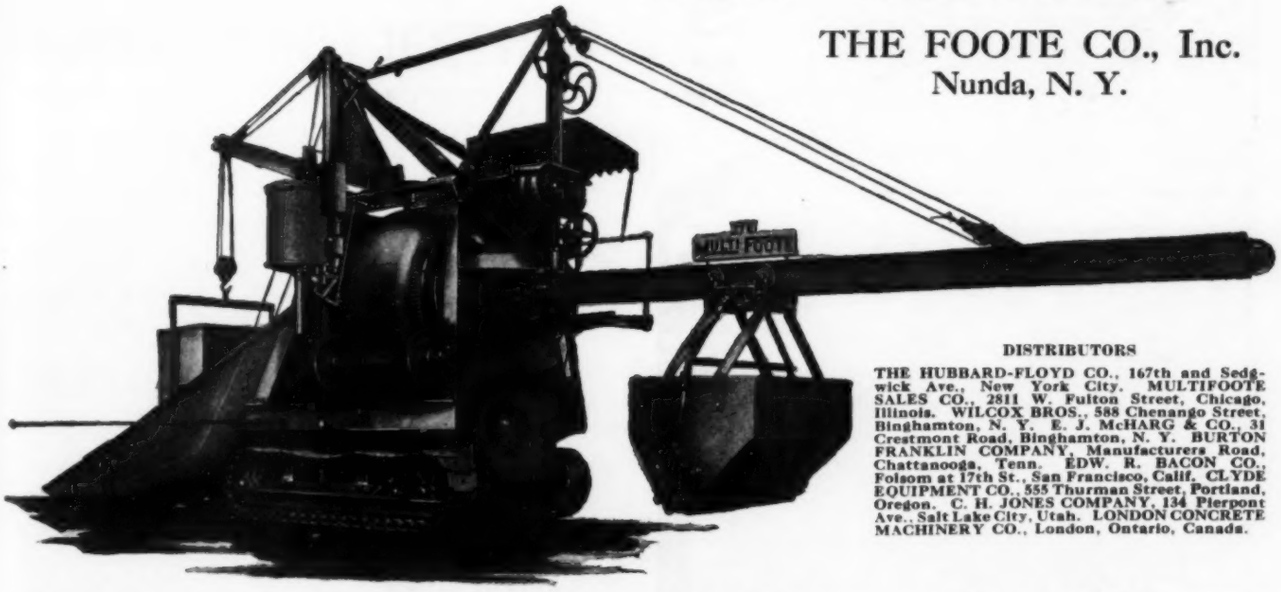

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Because of its electric arc-welded construction, the German Cruiser Koeln combines lightness and strength to such a degree that the use of larger guns and heavy armor is made possible.

DAKE uses electric welded steel in the S-LG HOISTS thus permitting extra strength, lighter weight, and easier movability.

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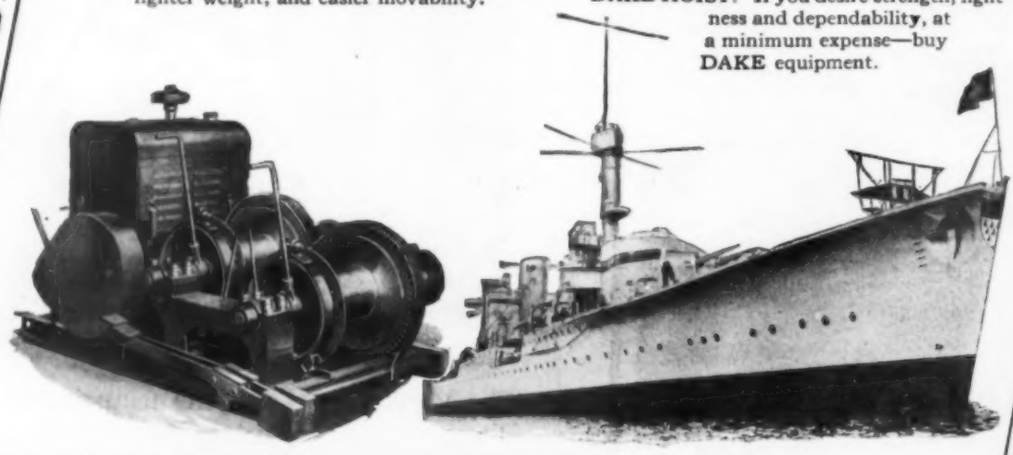

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Factory: Hackensack, N. J.

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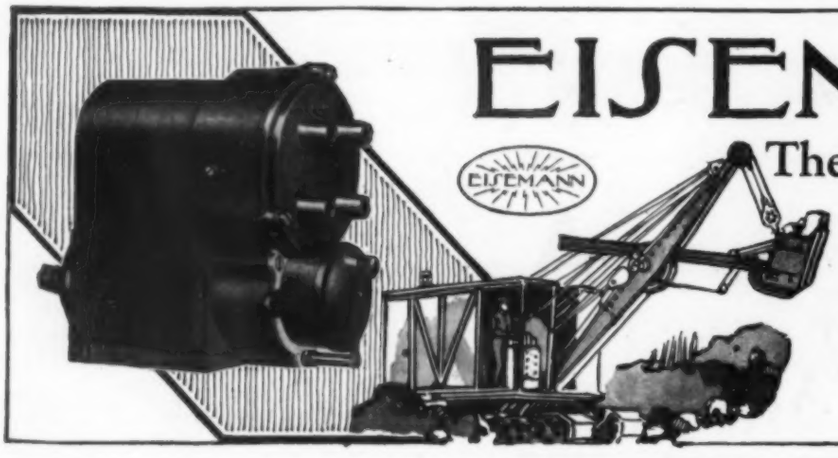

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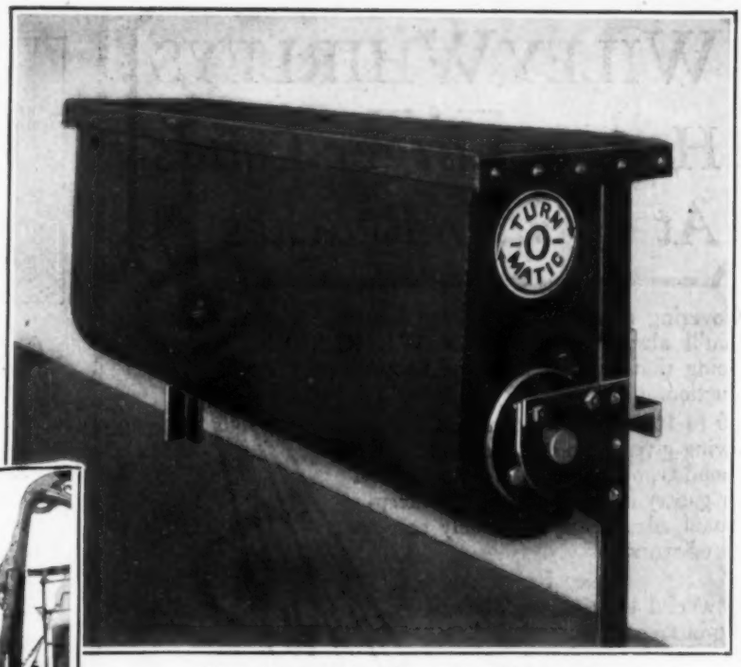
Out of the *Wheelbarrow* Age!



No wet cement in this. None blown away.

Observe the simplicity of operation

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THE BOX
THAT TURNS OVER

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Turn-O-Matics are filled at the batching plant. Cement stays absolutely dry. Rain can't wet it nor can wind blow it away, as when cement lies in the open on the aggregate.

When the lid of the box is lifted at the mixer, the batch is released. Cement streams over the aggregate, and into the mixer without touching the metal of body or skip.

Turn-O-Matic Cement Boxes eliminate men to handle sacks. Save truck time. In fact, contractors using Turn-O-Matics on their batch trucks have been able to take one or more trucks off their fleets.

Turn-O-Matics *save their cost in four miles of road work.*

They are easy to install and remove. Let us explain their operation and advantages. *Write.*

GEO. O. HARM CO.

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WARREN, OHIO

WILEY WHIRLEYS
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Handle Larger Loads At Greater Reaches

Covering more ground—doing more work—you'll always find WILEY WHIRLEYS doing that—saving time and boosting production.

60 to 100-foot live boom and full circle swing gives them unusual range. Easy mobility, on skids, rollers, track wheel or gantry mountings provides exceptional adaptability to widely scattered work.

Perfect balance, heavy frame, powerful hoisting engines and rapid swing permit handling heavier loads faster at a greater radius.

Let us know your conditions. Our Engineers will gladly advise with you in working out your individual problems.

Built Since 1919

The DAYTON-WHIRLEY CO.
Dayton, Ohio
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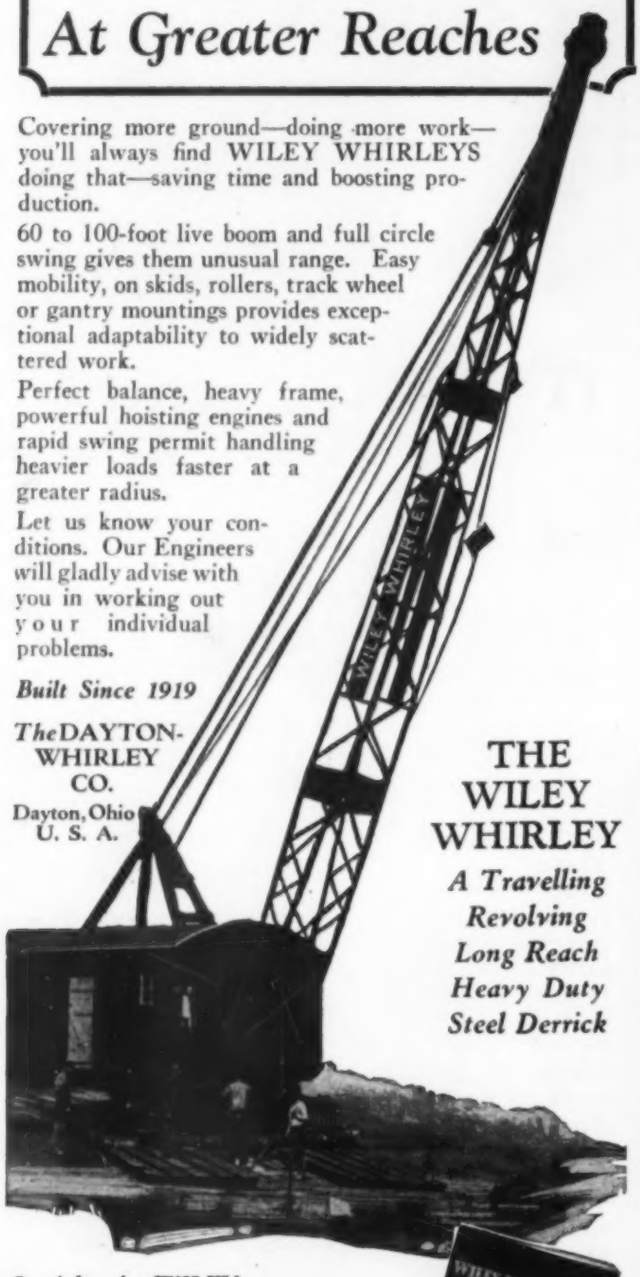

THE WILEY WHIRLEY
A Travelling
Revolving
Long Reach
Heavy Duty
Steel Derrick

Send for the WILEY WHIRLEY Catalog
It will help you profit from the experience of others and show you an unusual machine on many unusual jobs.

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Please send us the WILEY WHIRLEY Catalog.

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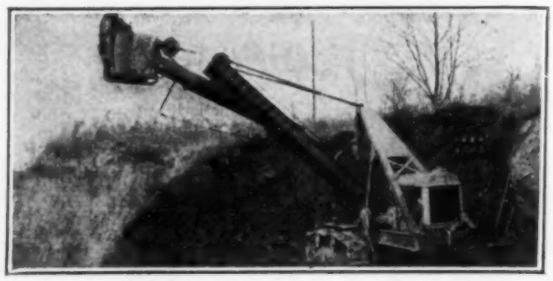

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THE speed, versatility, rugged construction, big yardage and low cost of the Fundom combination shovel, ditcher and crane, make it a sensational performer and money saver.

It makes small jobs profitable. Fast, full ¾ circle swing, 1/3 yard dipper capacity, 16½ foot radius, gasoline power.

With Trench Hoe attachment for ditching or Boom Extension for clamshell, dragline or crane, the Fundom is an unbeatable three-in-one digging machine.

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TARPAULINS & TENTS

Protection against weather-damage at low cost. "FULTEX" Khaki Waterproofed tents, tarpaulins and windbreaks—serviceable for every purpose—quality at moderate price. Burlap—in bale or made-up covers—for protecting green concrete.

Makers of famous "SHUREDRY", "DFMP", "USAMP".

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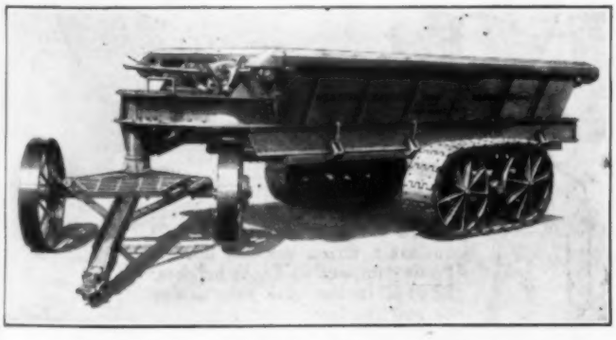
Reduce earth moving costs

Used separately or together, these two great machines probably do more to reduce earth moving costs than any other pieces of equipment in the field.

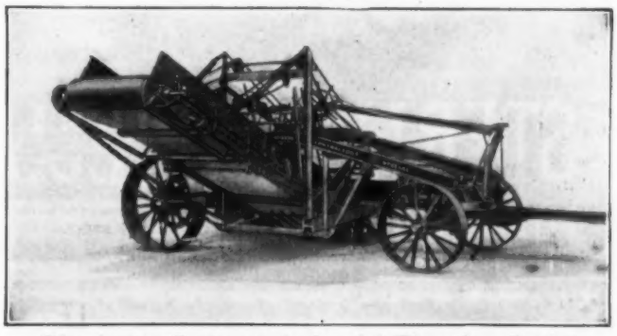
Western Crawler Dump Wagons

With its huge load, equal to that of many ordinary dump wagons, the Western 7-yard Crawler Dump Wagon will go wherever a tractor can lead. Since 90% of the load is carried on the broad Athey Truss Wheels, it can be pulled over soft ground, rough ground or sand, while heavily loaded. The unusual capacity of this all-steel wagon, combined with its speed of operation, makes it a great dollar saver.

For smaller earth-handling jobs, there is the Western 5-yard Crawler Dump Wagon which has all the features of the 7-yard model except the front trucks, as the entire load is balanced on the Athey Truss Wheels. Where the greatest possible yardage per trip is required, the 10-yard Western Crawler Dump Wagon is ideal. It is similar to the 7-yard model but has higher side walls and heavier Athey Truss Wheels.



The Western 7-Yard Crawler Dump Wagon



The Austin Contractor's Special Elevating Grader

Elevating Graders

There are Austin-Western elevating graders to meet every condition of earth handling. The Austin Contractor's Special has been designed to provide maximum strength, capacity and durability when working behind the most powerful type crawler tractors. It can be fitted with the Austin Power Take-Off to drive the elevator directly from the tractor. The Austin New Era Elevating Grader is recommended for less severe work.

The Western Lever Special, as its name suggests, is designed for use where enormous tonnage is a first requirement. The carrier is driven by a 4-cylinder engine mounted on the rear platform, relieving the tractor of part of its load. There are two other Western models; the Western Standard Elevating Grader and a model patterned after the Standard but equipped with a power take-off to operate the elevator directly from the tractor. Write us today for descriptive bulletins. The Austin-Western Road Machinery Co., 400 North Michigan Avenue, Chicago, Illinois. Branches in principal cities.

Austin-Western
ROAD MACHINERY

FROM THE GROUND-LINE ------- TO THE SKY-LINE

Sterling

WHEELBARROWS

are actively helping Chicago build its Cathedrals of Business
Quicker * Taller * Stronger * Newer.
Any dealer, wholesaler or Sterling branch can serve you immediately, with wheelbarrows or parts from their stock.

Branch offices and warehouses in Boston, New York, Philadelphia, Pittsburgh, Cleveland, Detroit, Chicago, St. Louis

STERLING WHEELBARROW COMPANY

STERLING ON A WHEELBARROW MEANS MORE THAN STERLING ON SILVER

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Jaeger Heavy Duty
10 S Holds 2 Bags
Built of Steel - ½ ton lighter, 50% stronger

AUTOMATIC SKIP SHAKER

Stops that man from pounding loader out of shape.

Fast - Portable - Sturdy

100% BALL BEARING

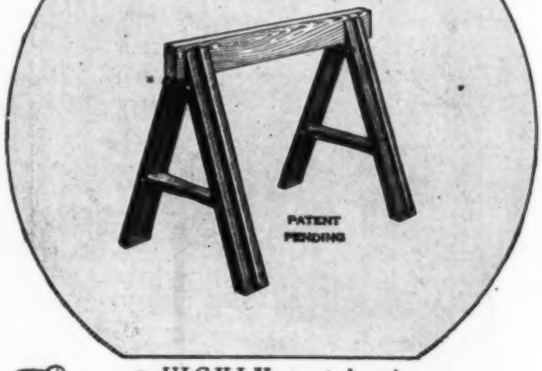
Skip Shaker loader, remixing drum action, Accurate Measure Water Tank and fast discharge (8 to 11 seconds) mean more thoro mixed concrete per day. Machined steel tracks, chilled ground faced rollers and ball bearings save power, save wear. Direct drive, one man control, dual tires for soft and hard ground.

Get our new low prices, terms on tilters or non-tilters, 3½ to 28 ft. sizes. OK'd by over 75,000 users.

7-S SPEED KING

THE JAEGER MACHINE CO.
800 Dublin Avenue Columbus, Ohio

The Indestructible Barricade



QUICKLY erected, using standard sized lumber, the TOLEDO Folding Steel Horse is rigid, strong and will outlast a dozen wooden horses. Folds compactly. Eight heights, 18 to 60 inches. Ask your dealer or write us for prices.

Save with Steel

TOLEDO
Folding Steel
HORSE

TPS The Toledo Pressed Steel Co.
TOLEDO OHIO

Continental Hose!!

This all-steel, modern, Diesel Engine Tow Boat was launched by the Dravo Contracting Co., Pittsburgh, Pa., on October 4th, 1929; the picture showing Continental Air and Oxygen-Acetylene Hose, was taken shortly before launching.

CONTINENTAL AIR, OXYGEN AND ACETYLENE WELDING, STEAM, SUCTION, WATER, and other types of Hose are found on up-to-date construction jobs all over the country.

"SATISFACTION AND SERVICE ARE THE BEST SALESMEN!!!"

Write Our Nearest Branch for Prices and Information:—

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CHICAGO, ILL.....27 West Illinois St.
CLEVELAND, O.....203 Perry Payne Bldg.
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PITTSBURGH, PA.....300 Penn Ave.
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TOLEDO, OHIO.....415 Michigan St.

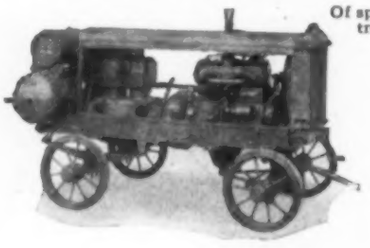
Continental Rubber Works, Erie, Pa.

AIR COMPRESSORS

SCHRAMM units have been accepted in all branches of industry, and models have been designed to operate under all conditions. Sizes range from 1¾ to 360 cu. ft. displacement per minute.

Look at these features.

Mounted on Chassis frame of 1½ ton truck.



Of spring mounted trailer type.

Reasons Why Schramm is Preferred

1. Greater horse-power in its Schramm-Buda Engine.
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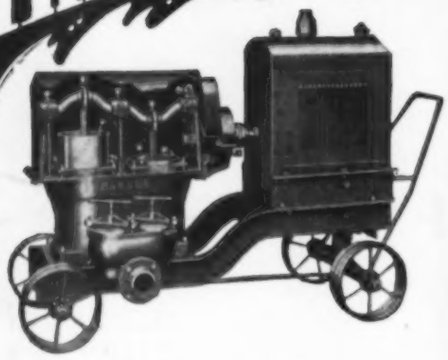
3. Heavy-duty self-aligning clutch.
4. Carburetor slow-down control device.
5. Gasoline strainer, guarded radiator and air filters on both engine and compressor.
6. Compressor parts are interchangeable.
7. Neat, efficient and dependable.

We have representatives in all principal cities

SCHRAMM Inc. West Chester Penna., U. S. A.

GETS RID OF THE WATER



Capacities up to 15,000 gallons per hour—maximum suction lift 25 feet—maximum total head, lift and force, 75 feet. Get the facts on drainage pumps from

THE BARNES MANUFACTURING CO.,
Mansfield, Ohio, U. S A.

BARNES
PLUNGER TRENCH PUMPS

21 improvements

that give you Greater Digging Power and Speed

The new Williams "Champion" — from its sturdy narrow head to its chrome-nickel steel digging teeth— is built for harder digging. Stronger corner bars, extended beyond the scoop and giving extra digging leverage; new all-welded scoops designed for easier filling, etc., etc.

Tell us about the work you are planning to do, and we'll send a description of the WILLIAMS "Champion" Bucket that can be definitely guaranteed to *give you bigger output.*

G. H. Williams Company
607 Haybarger Lane, Erie, Pa.
Branch Offices: New York, Pittsburgh, Chicago

WILLIAMS
FAST-DIGGING BUCKETS

157

"Here, Lad—

I'm beginning to think there is something to this arc-welded design.

Those 'Studies in Structural Arc Welding' that Lincoln has been sending us —are you filing them?"

The Lincoln "Stable-Arc" Welder

— welds easier
— makes better welds
— permits greater output because of the steady uniform arc throughout entire welding range, which is the result of:

- Variable voltage design
- Laminated magnetic circuit
- Separately-excited generator field
- Double control of welding heat
- All steel construction

No other welder has all these features.

"No, Pop—

I've been *using* them to design several jobs that are on the boards right now.

My friend here, *Arc Welding,* has been made a real figure in our work through such studies. Plate 11 of the series has just come in and gives us General Specifications for structural arc welding—and also Plate 12, giving a comparison of designs for wind bracing.

These studies represent the first *real* help we've received on *design* for a trend that is right on us today.

We need these plates because an engineer's work is not only dealing with facts, but with the application of imagination to what will prove to be facts in the near future—like television or mayhap—prohibition."

The Lincoln Electric Co.,
Dep't. No. 32-4, Cleveland, Ohio

LINCOLN "Stable-Arc" WELDER

W-142

BIGGS STEEL PIPE

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Our interest in the contractor's problems goes much farther than shipping him a certain quantity of steel pipe, welded or riveted. Our service includes *complete* installation as well, if desired. We offer you all the technical data the contractor could possibly require, besides personal supervision of the project from beginning to end. And you can rely on Biggs' facilities and service *"down to the very last ditch."*

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Steel Plate Construction of Every Description

The Biggs Boiler Works Company, Akron, Ohio
New York Detroit Chicago

BIGGS Steel Pipe *Riveted and Welded*

The Biggs Boiler Works Co. Akron Ohio

"Biggs", Kent St. and Case Ave., Akron

Send us this folder

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They "Stand the Gaff"

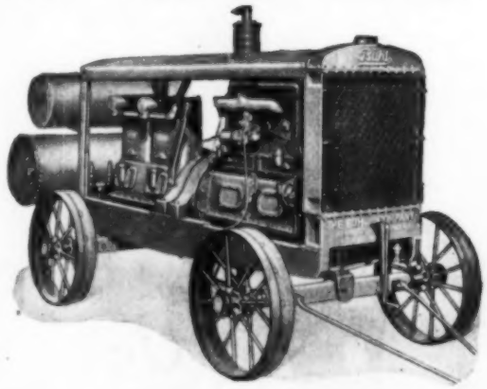
Any contractor who has checked the performance of Bull Frog barrows knows that they are designed and built to stand up under the rough usage typical of modern speed in construction work. There is a model specially adapted to every contracting and industrial need. Our new catalog shows the complete line of Bull Frog wheelbarrows, carts and scrapers; send for it.

THE TOLEDO WHEELBARROW CO.
TOLEDO, OHIO
Branch Office and Warehouse: CHICAGO—520 W. Erie St.

Bull Frog
No. 25 A-4
W.R.

THE *Buhl* COMPRESSOR

Has Force Feed Lubrication



Inasmuch as the BUHL is equipped with Force Feed Lubrication, giving positive lubrication to every moving part, it may be operated on a hillside or in an inclined position, with no danger of burning out bearings.

Furthermore the BUHL never has valve trouble because it is equipped with specially designed patented BUHL Dual Valves.

Write for Descriptive Literature

The *Buhl* Company

General Offices: Old Colony Bldg., CHICAGO

What's Mine is My Own

I do with it as I please—when I please—and how I please. I don't have to borrow what's mine—nor must I return it. I share it if I wish—but first and last, it's mine—for my own use.

My copy of *Construction Methods* comes to me regularly each month. It is the field engineer's most valuable means of keeping in touch with the new developments of modern civil engineering and construction. I need it—and I wouldn't be without it. Nor do I want to read it after others have torn out the most interesting articles for their own use. I want the news complete, and I want it while it's new.

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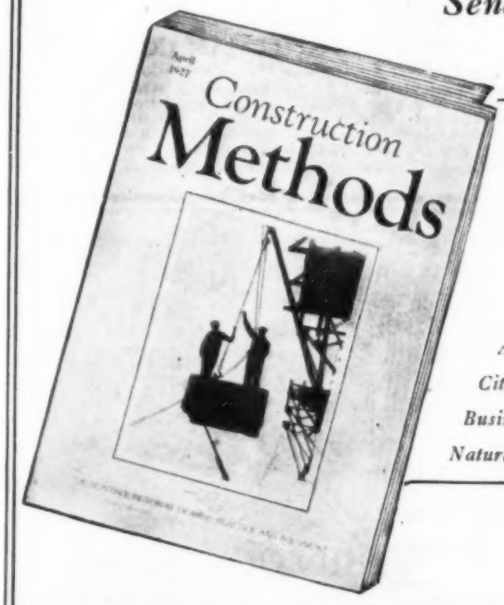

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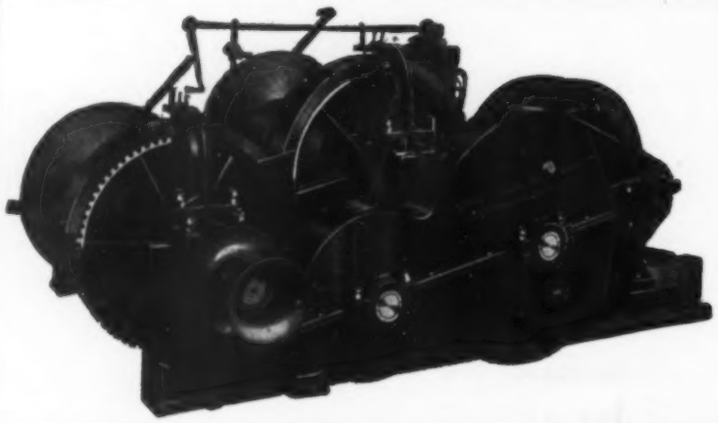

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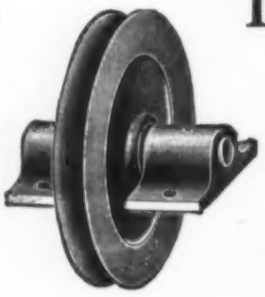
Machine-cut gears—large shafts—New Center Pinion Shaft Drive with Motor Gears enclosed in oil-tight case.

Write for Bulletin 52 for full particulars on "Electrics." Send for Bulletins on other equipment in which you are interested.

Hoists—Derricks—Cableways—
Slackline Excavators

STREET BROS. MACHINE WORKS
Chattanooga, Tenn.



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For Heavy Loads High Speed and Long Lifts use Ball or Roller Bearing Pillow Blocks instead of Plain Bearings

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Complete Stock Carried at Niagara Falls and New York City

Timber Derrick Fittings—Sheaves—Hand-Winches—Blocks

Write for prices. Dobbie all steel Derricks and Rotating Derricks.

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DO YOU BEND MUCH PIPE?

If you do you need a

Watson-Stillman
Hydraulic Pipe Bender

These machines are not only rapid and economical of labor, but the bends are made uniform and without danger of buckling or crushing.

We build pipe bends in a variety of types and sizes as well as a full line of Hydraulic Machinery including jacks, pumps, accumulators, presses, shears, etc.

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Send the information on Sabin Gloves.

Name .....

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If you wish a pair of No. 209 Gloves enclose $1.50 and check here ( ).

Hands in Sabin's Gloves are more productive. They're protected from the work and the cold—they aren't afraid to "grab hold".

Just as the workman knows there isn't a better glove than Sabin's—so do contractors and foremen know that hands in Sabin's gloves do more work.

Here's No. 209—especially for cable work but good for any job because it's washable, has "Hold-Tight" back. It has protected outseams, cream horse hand and back of fingers to knuckles.

AND only $1.50 a pair.

Send the coupon—be sure to mention your size.

SABIN CO.--*Gloves*
536-40 W. Federal St., Youngstown, Ohio

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Construction Methods

Tenth Ave. at 36th St., New York City

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Will also consider purchase of above shovel attachment if price is attractive. Address

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FOR FOUNDATION, COFFERDAM AND SEWER WORK

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Searchlight Department

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Mack

PERFORMANCE COUNTS

TODAY MACK OFFERS

MODEL BJ—SIX CYLINDER

MODEL BC—SIX-CYLINDER

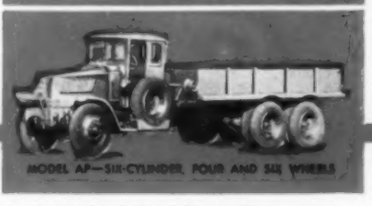
MODEL AB—FOUR- AND SIX-CYLINDER

MODEL BC—FOUR- AND SIX-CYLINDER

MODEL BJ—SIX-CYLINDER

MODEL AC—FOUR-CYLINDER, FOUR AND SIX WHEELS

MODEL AE—FOUR-CYLINDER


MODEL AP—SIX-CYLINDER, FOUR AND SIX WHEELS

FROM ONE TO TEN TONS CAPACITY

The most comprehensive line of trucks ever built under one trade mark

Mack now offers trucks of from one to ten tons capacity—either four or six cylinders—four or six wheels—four types of final drive—a wide range of wheelbase lengths—and various types of transmissions each fitted to a specific need. In addition, an equally comprehensive line of tractors, trailers and semi-trailers now bear the Mack nameplate—giving the Mack line a scope which embraces EVERY hauling requirement.

And each model is as true as the famous Mack Bulldogs to the Mack tradition of quality, long life, and economy.

Do not buy another truck—regardless of type or capacity—until you have seen the complete modern Mack line.

MACK TRUCKS, INC.
25 Broadway New York, N. Y.

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TRUCKS • BUSES • FIRE APPARATUS • LOCOMOTIVES

DETROIT PUBLIC LIBRARY
DETROIT
MICH

Traffic Crosses the Raritan

on TEXACO ASPHALT

Raritan River Bridge, Route 25, New Jersey. Paved with TEXACO Sheet Asphalt by the Utility Construction Company, New Brunswick, N. J.

New Jersey is building a great highway which, when finished, will be one of the most important in the East. It will span the State, linking the Holland Vehicular Tunnel in Jersey City with the Philadelphia-Camden bridge. It will cut down greatly the time by automobile from New York City to Philadelphia.

The newest link of this great trans-State route is the Raritan River Bridge near New Brunswick. To serve the large volume of traffic which will use this bridge, it has been paved with TEXACO Sheet Asphalt. This adds one more to the important highways and city thoroughfares of New Jersey, which have been paved with TEXACO.

TEXACO Asphalt has been employed by paving contractors in the construction of the nation's streets and highways for a quarter of a century.

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